

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-NR-1

Control No.: 2015-024

Waste Site Code(s)/Subsite Code(s): 100-N-85

Reclassification Category: Interim ☒ Final ☐

Reclassification Status: Closed Out ☒ No Action ☐ Rejected ☐
RCRA Post-closure ☐ Consolidated ☐ None ☐

Approvals Needed: DOE ☒ Ecology ☒ EPA ☐

Description of current waste site condition:

The 100-N-85, 1716-N Gas Station Fuel Tanks waste site consisted of potentially contaminated soil that was believed to remain after removal of two underground storage tanks. Based on historical information, the site was believed to contain residual petroleum contamination in the subsurface soil at a depth below 10 m (35 ft) and was recommended for remediation in the *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2011) and added to the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999). The tanks, 100-N-SS-27 and 100-N-SS-28, were part of the 100-N Fuel Station. The fuel station was used to fuel vehicles supporting 100-N production activities. Tank 100-N-SS-27 contained regular gasoline and later unleaded gasoline; tank 100-N-SS-28 originally held diesel and later held gasoline. Tank 100-N-SS-27 was removed in December 1990 and tank 100-N-SS-28 was removed in July 1991. Petroleum contaminated soil was encountered during removal of the tanks; excavation of contaminated soil was performed in September 1991 to a depth of 7.6 m (25 ft) and in April 1992 to a depth of 10 m (36 ft).

Subsequent review of the site information indicated that characterization of the soil below 10 m (35 ft) was needed in order to determine if additional soil remediation was necessary and, if so, decide if excavation or bioremediation using bioventing should be used. The U.S. Environmental Project Agency's data quality objective process (EPA 2006) was used to develop a sampling design for characterizing the deep vadose zone soil and groundwater at the 100-N-85 waste site and determine if additional remediation was necessary. A characterization borehole was drilled from February 3 through February 17, 2015, to a total depth of 30.46 m (99.95 ft) below ground surface at a location with the highest potential for encountering petroleum contamination in the vadose zone. Eleven soil samples were collected at discrete depth intervals through the vadose zone soil and one groundwater sample was collected. No petroleum contamination or other hazardous constituents were detected above soil or groundwater cleanup criteria.

The results of the characterization sampling indicate the 100-N-85 waste site meets remedial action objectives (RAOs) and remedial action goals (RAGs) established by the 100-N Area ROD (EPA 1999) and that additional remediation is not required. The selected action involved (1) drilling and sampling a characterization borehole, (2) demonstrating through sampling that cleanup goals have been achieved, and (3) proposing the site for reclassification as Interim Closed Out.

Basis for reclassification:

Characterization sampling results for the 100-N-85 waste site demonstrate that the site meets the RAOs and corresponding RAGs established in the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area*, U.S. Department of Energy, Richland Operations Office, Richland, Washington (DOE-RL 2013) and the 100-N Area ROD (EPA 1999) and support a reclassification of the 100-N-85 waste site to Interim Closed Out. These sampling results established that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. No institutional controls are necessary to prevent uncontrolled drilling or deep zone soil excavation. The basis for reclassification is described in the *Remaining Sites Verification Package for the 100-N-85, 1716-N Gas Station Fuel Tanks Waste Site* (attached).

WASTE SITE RECLASSIFICATION FORM

Operable Unit: 100-NR-1

Control No.: 2015-024

Waste Site Code(s)/Subsite Code(s): 100-N-85

Regulator comments:

Waste Site Controls:

Engineered
Controls:

☐ Yes

☒ No

Institutional
Controls:

☐ Yes

☒ No

O&M
Requirements:

☐ Yes

☒ No

If any of the Waste Site Controls are checked Yes, specify control requirements, including reference to the Record of Decision, TSD Closure Letter, or other relevant documents:

J. P. Neath

DOE Federal Project Director (printed)

Signature

Date

9/23/15

N. Menard

Ecology Project Manager (printed)

Signature

Date

9/25/15

N/A

EPA Project Manager (printed)

Signature

Date

**REMAINING SITES VERIFICATION PACKAGE
FOR THE 100-N-85, 1716-N GAS STATION
FUEL TANKS WASTE SITE**

Attachment to Waste Site Reclassification Form 2015-024

October 2015

**REMAINING SITES VERIFICATION PACKAGE
FOR THE 100-N-85, 1716-N GAS STATION
FUEL TANKS WASTE SITE**

EXECUTIVE SUMMARY

The 100-N-85, 1716-N Gas Station Fuel Tanks waste site is located within the 100-NR-1 Operable Unit and consisted of potentially contaminated soil that was believed to remain after removal of two underground storage tanks. Based on historical information, the site was believed to contain residual petroleum contamination in the subsurface soil at a depth below 10 m (35 ft) and was recommended for remediation in the *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (100-N Area ESD) (EPA 2011) and added to the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD) (EPA 1999). The underground storage tanks, 100-N-SS-27 and 100-N-SS-28, were part of the 100-N Fuel Station. The fuel station was used to fuel vehicles supporting 100-N production activities. Tank 100-N-SS-27 contained regular gasoline and later unleaded gasoline; tank 100-N-SS-28 originally held diesel and later gasoline. Tank 100-N-SS-27 was removed in December 1990 and tank 100-N-SS-28 was removed in July 1991. Petroleum contaminated soil was encountered during removal of the tanks; excavation of contaminated soil was performed in September 1991 to a depth of 7.6 m (25 ft) and in April 1992 to a depth of 10 m (36 ft).

Subsequent review of the site information indicated that characterization of the soil below 10 m (35 ft) was needed in order to determine if additional soil remediation was necessary and, if so, decide if excavation or bioremediation using bioventing should be used. The U.S. Environmental Protection Agency's data quality objective process (EPA 2006) was used to develop a sampling design for characterizing the deep vadose zone soil and groundwater at the 100-N-85 waste site and determine if additional remediation was necessary. A characterization borehole was drilled from February 3 through February 17, 2015, to a total depth of 30.46 m (99.95 ft) below ground surface at a location with the highest potential for encountering petroleum contamination in the vadose zone. Eleven soil samples were collected at discrete depth intervals through the vadose zone soil and one groundwater sample was collected. No petroleum contamination or other hazardous constituents were detected above soil or groundwater cleanup criteria.

The results of the characterization sampling indicate the 100-N-85 waste site meets remedial action objectives and remedial action goals (RAGs) established by the 100-N Area ROD (EPA 1999) and that additional remediation is not required. A summary of the cleanup evaluation for the soil sampling results against the applicable RAGs is presented in Table ES-1.

Table ES-1. Summary of Remedial Action Goals for the 100-N-85 Waste Site.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain dose rate of <15 mrem/yr above background over 1,000 years.	Radionuclides were not identified as COPCs for this site.	NA
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	There is no direct exposure pathway for this site because it is located at a depth greater than 4.6 m (15 ft bgs).	NA
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	There is no direct exposure pathway for this site because it is located at a depth greater than 4.6 m (15 ft) bgs.	NA
	Attain a cumulative hazard quotient of <1 for noncarcinogens.		
	Attain an excess cancer risk of <1 x 10 ⁻⁶ for individual carcinogens.		
	Attain a cumulative excess cancer risk of <1 x 10 ⁻⁵ for carcinogens.		
Groundwater/River Protection – Radionuclides	Attain single COPC groundwater and river RAGs.	Radionuclides were not identified as COPCs for this site.	NA
	Attain National Primary Drinking Water Regulations: 4 mrem/yr (beta/gamma) dose standard to target receptor/organ ^a .		
	Meet drinking water MCL for alpha emitters.		
	Meet total uranium standard of 21.2 pCi/L ^b .		
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and Columbia River cleanup requirements.	Residual concentrations of nonradionuclide COPCs are all less than RAGs.	Yes

^a “National Primary Drinking Water Regulations” (40 *Code of Federal Regulations* 141).

^b Based on the isotopic distribution of uranium in the 100 Area, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).

bgs = below ground surface

COPC = contaminant of potential concern

DOE = U.S. Department of Energy

MCL = maximum contaminant level

NA = not applicable

RAG = remedial action goal

The results of the borehole characterization sampling were used to make a reclassification decision for the 100-N-85 waste site in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011).

In accordance with this evaluation, the characterization sample results support a reclassification of the 100-N-85 waste site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding RAGs established in the *Remedial Design*

Report/Remedial Action Work Plan for the 100-N Area (DOE-RL 2013) and the 100-N Area ROD (EPA 1999). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The shallow zone soils at the site consist of clean backfill material that was placed to a depth of approximately 10 m (36 ft) after removal of the tanks and excavation of contaminated soils. Therefore, residual contaminant concentrations remaining at the site do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils. The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River and that additional remediation of the deep vadose zone at a depth greater than 4.6 m (15 ft) bgs for petroleum contamination, as identified in the 100-N Area ESD (EPA 2011), is not required. Additionally, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required.

Soil cleanup levels were established in the 100-N Area ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the 100-N Area ROD, a comparison against ecological risk screening levels is made for sites with contamination located above 4.6 m (15 ft). However, because the 100-N-85 waste site is located below a depth of 4.6 m (15 ft), there is no risk to ecological receptors and no evaluation of ecological risk is required.

**REMAINING SITES VERIFICATION PACKAGE
FOR THE 100-N-85, 1716-N GAS STATION
FUEL TANKS WASTE SITE**

STATEMENT OF PROTECTIVENESS

The 100-N-85, 1716-N Gas Station Fuel Tanks waste site characterization sampling data, site evaluations, and supporting documentation demonstrate that this site meets the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 100-N Area* (100-N RDR/RAWP) (DOE-RL 2013) and the *Interim Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington* (100-N Area ROD) (EPA 1999). The shallow zone soils at the site consist of clean backfill material that was placed to a depth of approximately 10 m (36 ft) after removal of the tanks and excavation of contaminated soils. Therefore, residual contaminant concentrations remaining at the site do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils. The characterization sampling results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River and that additional remediation of the deep vadose zone at a depth greater than 4.6 m (15 ft) below ground surface (bgs) for petroleum contamination, as identified in the *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington* (EPA 2011) is not required. Additionally, institutional controls to prevent uncontrolled drilling or excavation into the deep zone soil are not required.

Soil cleanup levels were established in the 100-N Area ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the 100-N Area ROD, a comparison against ecological risk screening levels is made for sites with contamination located above 4.6 m (15 ft). However, because the 100-N-85 waste site is located below a depth of 4.6 m (15 ft), there is no risk to ecological receptors and no evaluation of ecological risk is required.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-N-85, 1716-N Gas Station Fuel Tanks waste site consisted of contaminated soil that remained after removal of two underground storage tanks (USTs). Based on historical information (WHC 1993, BHI 1995), the site was believed to contain residual petroleum contamination in the subsurface soil at a depth below 10 m (35 ft) and, therefore, was recommended for remedial action (WCH 2010). Figure 1 shows the location of the 100-N-85 waste site. Figure 2 provides an aerial photograph of the 100-N Area and the location of the gas station.

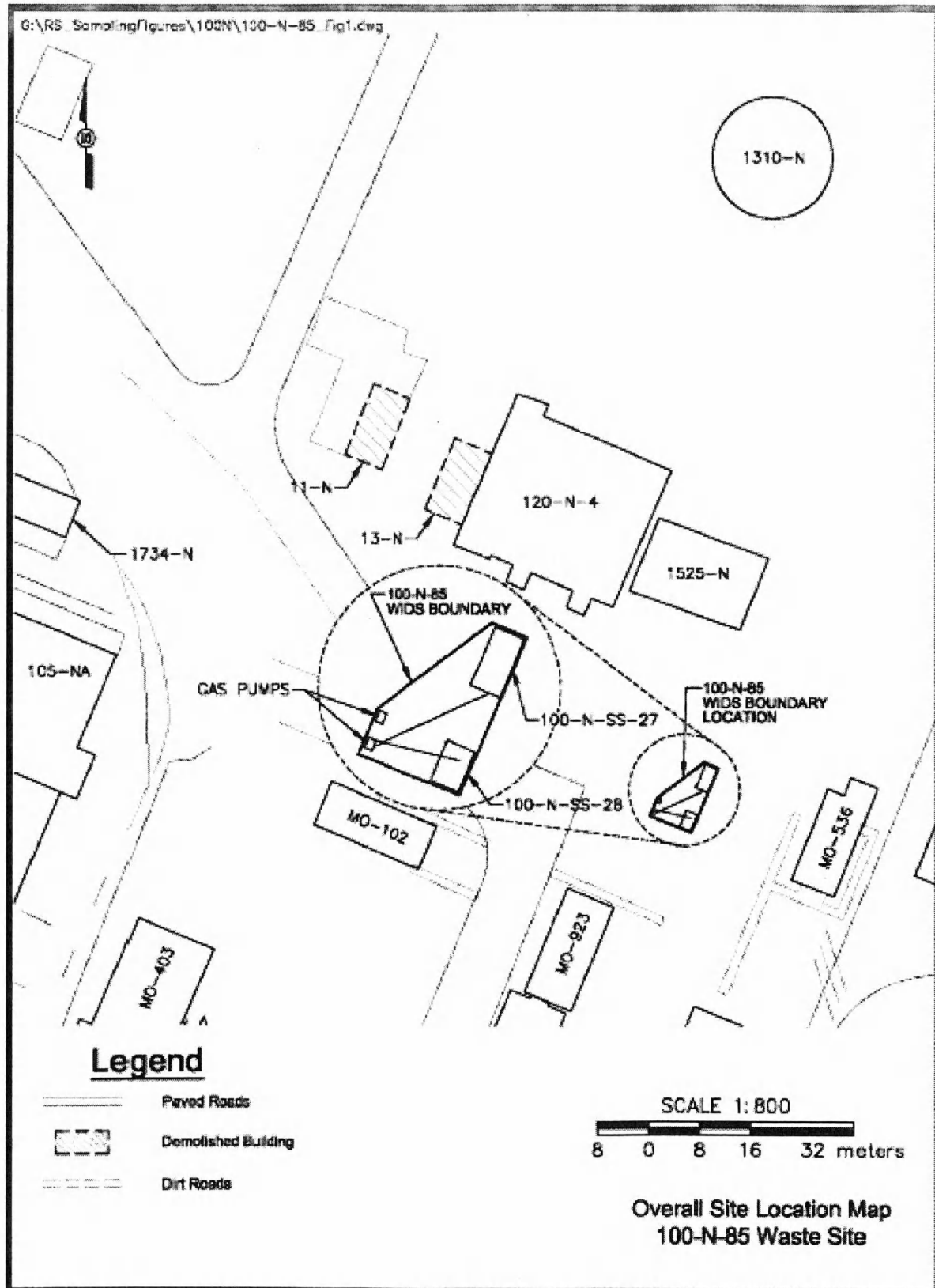
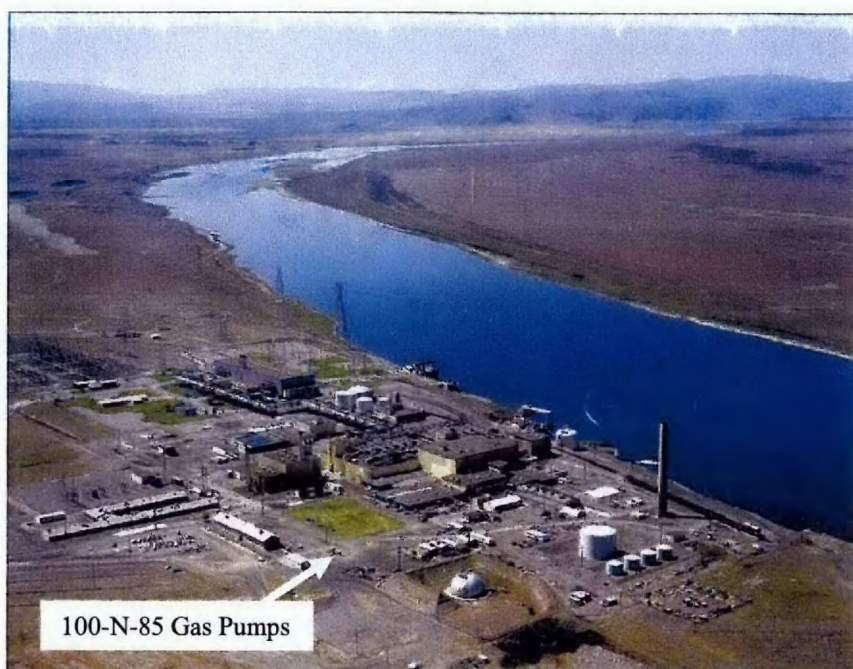
Figure 1. The 100-N-85 Waste Site Location Map.

Figure 2. Aerial Photograph Showing Location of Gas Pumps (May 6, 1976).



Underground storage tanks 100-N-SS-27 and 100-N-SS-28 were part of the 100-N Fuel Station (Figures 3 and 4). The fuel station was used to fuel vehicles supporting production activities. Tank 100-N-SS-27 (11,356 L [3,000 gal]) contained regular gasoline and later unleaded gasoline; tank 100-N-SS-28 (7,571 L [2,000 gal]) originally held diesel and later gasoline. After failing a tank-tightness test, UST 100-N-SS-27 was removed in December 1990 (Figure 5).

Figure 3. The 1718-NA Fuel Station (February 24, 1984).



Figure 4. The 1716-NA Fuel Station Prior to Removal (December 1990).

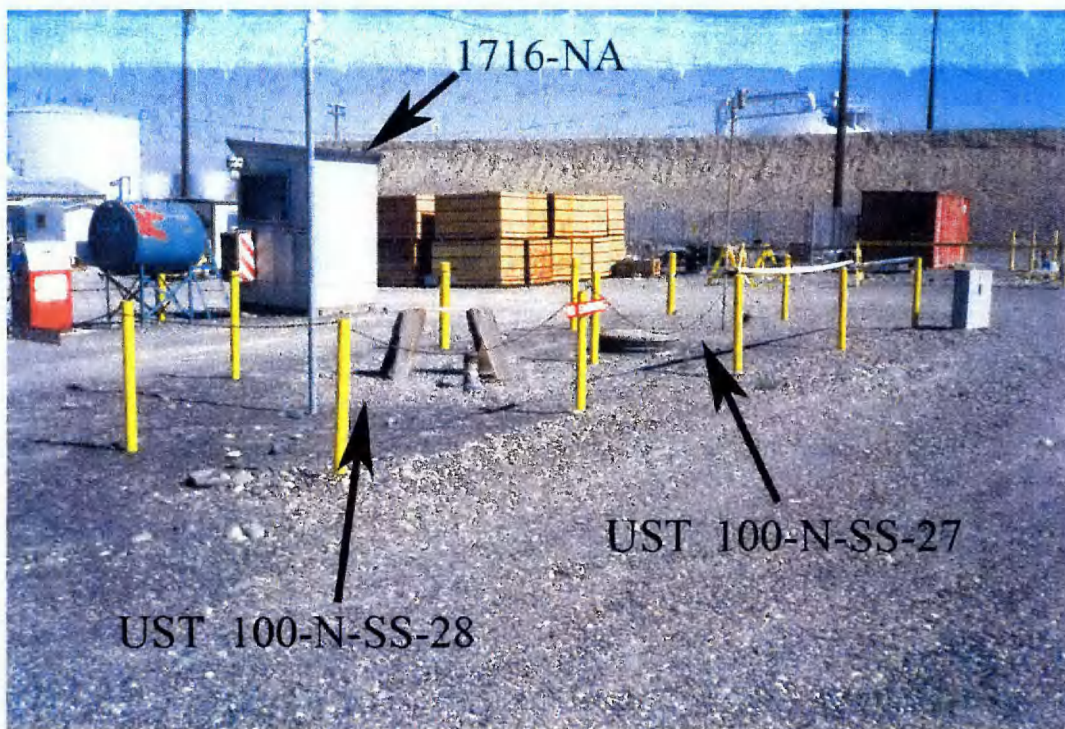


Figure 5. Uncovered 100-N-SS-27 Tank Shortly Before Removal (December 18, 1990).



Soil contaminated with petroleum products was detected within the excavation during the tank removal and adjacent to UST 100-N-SS-28. As much of the contaminated soil as possible was removed without disturbing tank 100-N-SS-28, which was in service at the time (WHC 1993, BHI 1995). Tank 100-N-SS-27 was closed in accordance with Washington State Department of Ecology (Ecology) requirements; the closure is documented in *100-N Area Underground Storage Tank Closures* (WHC 1993).

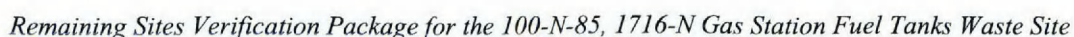
Tank 100-N-SS-28 was removed on July 17, 1991 (Figure 6). Soil contaminated with petroleum products was detected during removal of the tank. Excavation of the contaminated soil was resumed in September 1991, to a depth of 7.6 m (25 ft) where backhoe limitations prevented further work. There was no indication that the extent of the contamination plume had been determined. Work was abandoned at this time pending further evaluation.

Figure 6. Looking Southeast at the 100-N-SS-28 Tank as it was Uncovered (July 1991).



In April 1992, additional soil was excavated to a reported depth of 10 m (36 ft) (WHC 1993). Soil contaminated with weathered gasoline and diesel fuel was still detected in a sand lens in the excavation. These soils could not be removed because the backhoe arm was not long enough to dig deeper. Field screening results using an organic vapor monitor (OVM) indicated 760 ppm at 10 m (36 ft) bgs. Offsite laboratory sample results indicated maximum contaminant concentrations of toluene at 4.7 mg/kg, diesel at 1,000 mg/kg, and kerosene at 3,085 mg/kg. The site was backfilled with clean fill following excavation activities.

Figure 7. Conceptual Model/Cross Section for the 100-N-85 Waste Site.



A test pit investigation was performed in April 1994 to verify the results of the borehole and support further evaluation of the site. The excavation started approximately 3.7 m (12 ft) south of the borehole and continued north through the borehole and the former tank location. In close proximity to the borehole and approximately 6.7 m (22 ft) bgs, a small amount of black sand was encountered. The sand was moist and a petroleum odor was evident. The OVM readings indicated 1.2 ppm. Field immunoassay test results indicated less than 200 mg/kg diesel. Laboratory results detected 86 mg/kg diesel and 24 mg/kg gasoline at a depth of 9.8 m (32 ft) bgs.

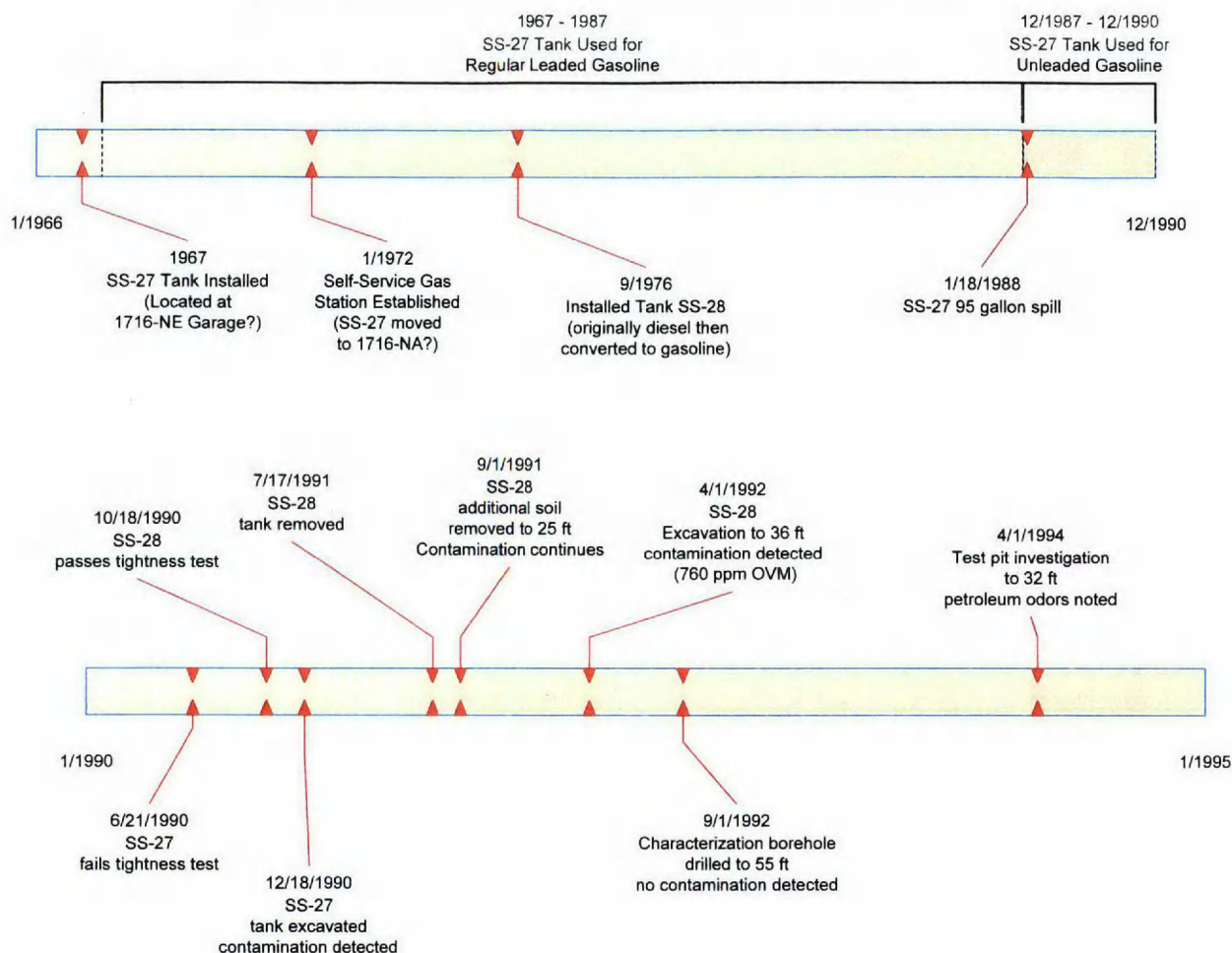
Increased quantities of the black sand were encountered as the excavation continued. Weathered diesel odors increased with the exposure of the black sand. A bench was excavated for the backhoe approximately 7.6 m (25 ft) north of the borehole. The bench allowed increased excavation depth capabilities. The OVM readings at approximately 7.6 m (25 ft) bgs were 55 ppm.

A sample was collected at 8.2 m (27 ft) bgs. The OVM readings were 250 ppm. The excavation dimensions at this depth were approximately 9 m (30 ft) long by 4.5 m (15 ft) wide at the ground surface. The base of the test pit was estimated at 3.1 m (10 ft) wide. Field immunoassay test results again indicated less than 200 mg/kg diesel.

Cave-in material from the sidewalls of the pit was becoming a problem with increasing depth. The test pit was cleaned of cave-in material and the depth increased to 9.8 m (32 ft) bgs. Black sand and petroleum odors were still present. The OVM readings were 150 ppm and immunoassay field screening results were less than 200 mg/kg diesel. Following completion of the investigation, the site was backfilled with the clean fill previously used. To the extent possible, the soil was backfilled in the reverse order in which it was removed (BHI 1995). The *100-N Area Underground Storage Tank Closures* (WHC 1993) recommended excavation to a depth of at least 12 m (40 ft) to support site closure. This depth was not reached with the 1994 test pit.

A letter was issued on December 21, 1994, to the U.S. Department of Energy, Richland Operations Office (DOE-RL) recommending closure of UST 100-N-SS-28, with *100-N Fuel Station Underground Storage Tank Site Characterization*, (BHI 1995) attached to a letter (BHI 1994). However, BHI (1995) was subsequently revised and issued in March 1995 and no subsequent letter to DOE-RL or Ecology could be located providing notification of closure of UST 100-N-SS-28. Conflicting information in the BHI report may be the basis for no closure documentation submitted to DOE-RL and Ecology for this tank.

Specifically, the 1994 investigation did not excavate to the WHC (1993) recommended depth of 12 m (40 ft) and Figure 2 of BHI (1995) is misleading, as it does not show the base of the 1992 investigation at 10 m (36 ft), alluding that the 1994 investigation was excavated to a deeper depth than the previous investigations. Figure 8 provides a timeline of events associated with the 100-N-85 waste site.

Figure 8. Timeline of Events Associated with 100-N-85.

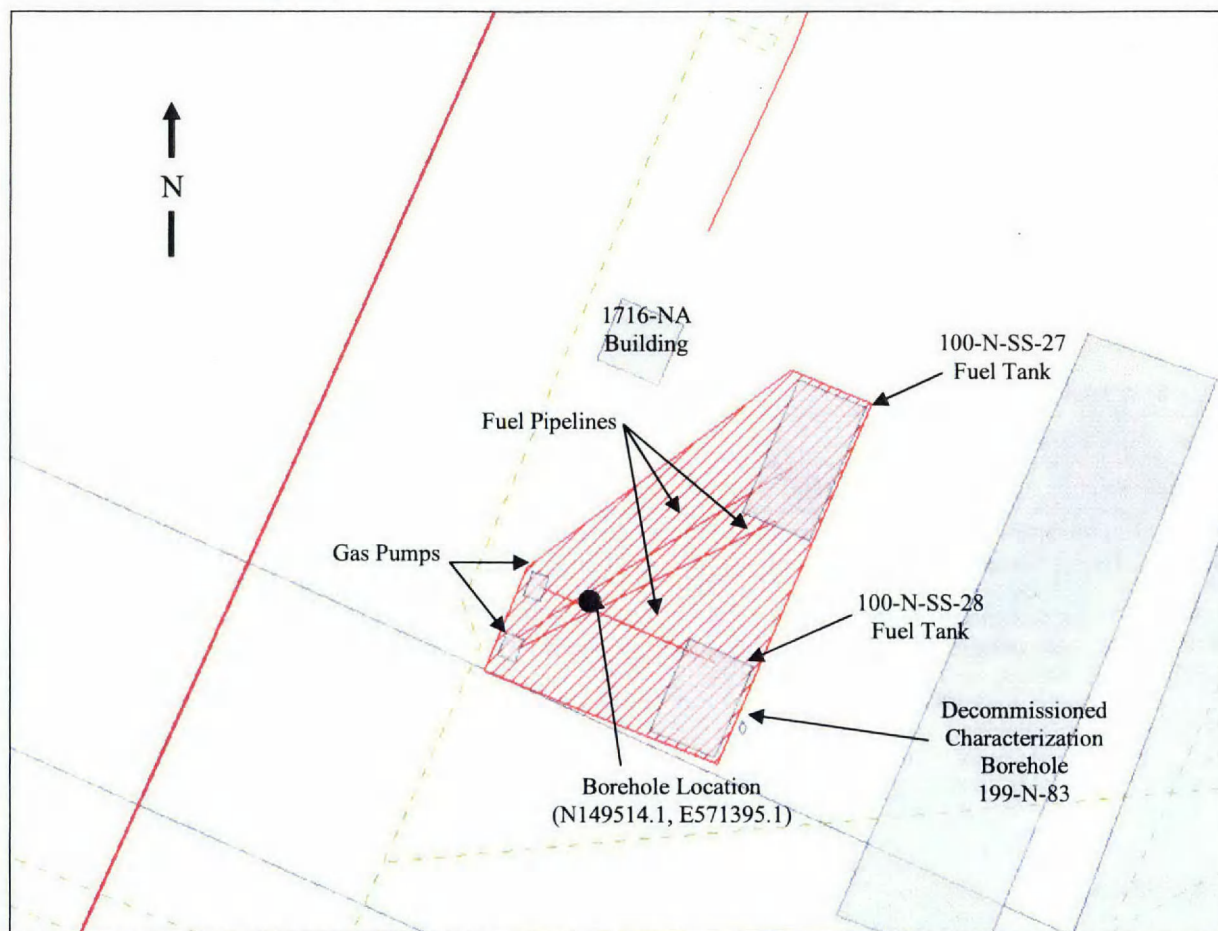
The nearest groundwater monitoring well, 199-N-57, was drilled in June 1987 and is located approximately 33 m (108 ft) to the northeast of the removed 199-N-S-28 tank. No petroleum contamination has ever been detected in this well.

CHARACTERIZATION SAMPLING ACTIVITIES

Characterization sampling at the 100-N-85 waste site was performed to determine the vertical extent of petroleum contamination and support implementation of a remedy, if needed. The U.S. Environmental Protection Agency (EPA) data quality objectives process, as described in *Guidance on Systematic Planning using the Data Quality Objectives Process* (EPA 2006), was used to develop the sampling and analysis design. Final requirements were provided in *Sampling and Analysis Instruction for Installation of the 100-N-85, 1716-N Gas Station Fuel Tanks Characterization Borehole* (100-N Area SAI) (WCH 2014).

One characterization borehole was drilled from February 3, 2015, through February 17, 2015, to a total depth of 30.46 m (99.95 ft) bgs at a location between the storage tanks and the service station pumps where the pipelines intersect at approximately N 149514.1, E 571395.1 (North America Datum of 1983). The borehole was drilled to support completion as a groundwater monitoring well or bioventing air inject well, if needed. The borehole location is shown in Figure 9. Eleven soil samples were collected at discrete depth intervals through the vadose zone soil and one groundwater sample for filtered and nonfiltered laboratory analysis was collected. The sampling results are provided in Appendix A.

Figure 9. 100-N-85 Characterization Borehole Location.



No petroleum contamination or other hazardous constituents were detected above soil or groundwater cleanup levels. Therefore, as agreed with DOE and Ecology, since no contamination was detected in soil or groundwater above cleanup levels at the site a decision was made to decommission the borehole. The results of the characterization sampling indicate the waste site meets remedial action objectives and remedial action goals (RAGs) established by the 100-N Area ROD (EPA 1999). The following subsections provide additional discussion of the characterization sampling.

Contaminants of Potential Concern

The contaminants of potential concern (COPCs) for the 100-N-85 characterization sampling were developed during the data quality objectives process and provided in the sampling and analysis instruction (WCH 2014). Total petroleum hydrocarbons (TPH) gasoline range, TPH diesel range, TPH motor oil range, extractable petroleum hydrocarbons, benzene, ethylbenzene, toluene, xylene, and polycyclic aromatic hydrocarbons were identified as COPCs for soil and groundwater samples. In addition, gross beta activity associated with strontium-90 and anions were included as COPCs for groundwater samples. Laboratory analytical methods are presented in Table 1.

Table 1. Laboratory Analytical Methods.

Analytical Method	Contaminant of Potential Concern
TPH-NWTPH-G	Total petroleum hydrocarbons – gasoline range
TPH-NWTPH-D	Total petroleum hydrocarbons – diesel range
TPH – EPA Method NWTPH-D+	Total petroleum hydrocarbons – heavy oil range
WA MTCA – EPH	Extractable petroleum hydrocarbons
VOA – EPA Method 8260	Benzene, ethylbenzene, toluene, xylene
PAH – EPA Method 8310	Polycyclic aromatic hydrocarbons
Anions – EPA Method 300.0 ^a	Anions
Gross beta activity – proportional counting ^a	Strontium-90

^a Analytical method performed for groundwater samples only.

EPA = U.S. Environmental Protection Agency

EPH = extractable petroleum hydrocarbons

NWTPH-D = Northwest total petroleum hydrocarbons – diesel

NWTPH-D+ = Northwest total petroleum hydrocarbons – heavy oil range

NWTPH-G = Northwest total petroleum hydrocarbons – gasoline

PAH = polycyclic aromatic hydrocarbons

TPH = total petroleum hydrocarbons

VOA = volatile organic analysis

WA MTCA = Washington Model Toxics Control Act

Sample Collection

Sampling was performed in accordance with the 100-N Area SAI (WCH 2014) to fulfill the requirements of the *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites* (DOE-RL 2006). Soil sampling was performed in accordance with CH2MHill Plateau Remediation Company's *Groundwater Remediation Project Procedures*, SGRP-PRO-SMP-50062 (GRP-FS-04-G-030), "VOC Soil and Sediment Sampling," and SGRP-PRO-SMP-50061 (GRP-FS-04-G-029), "Non-VOC Soil and Sediment Sampling."

Discrete vadose zone soil samples were collected at approximate 1.5-m (5-ft) depth intervals beginning at a depth of approximately 6.1 m (20 ft) bgs and continuing to the top of the water

table at approximately 21 m (68.9 ft) bgs. The samples were collected using an 11.43-cm (4.5-in.) inner-diameter split-spoon sampler equipped with four 15.2-cm (6-in.) long liners. One additional soil sample was collected from within the aquifer at a depth of approximately 28 m (92 ft). The samples were submitted for laboratory analysis of the COPCs identified in Table 1.

One groundwater sample was collected from within the aquifer at a depth of approximately 22.8 m (74.9 ft) bgs. The sample was submitted for filtered and nonfiltered laboratory analysis for the COPCs identified in Table 1.

Table 2 provides a summary of the samples that were collected and Figure 10 shows the approximate borehole sample intervals. The results of soil and groundwater samples are provided in Appendix A and B, respectively.

Table 2. The 100-N-85 Borehole Sample Summary ^a.

Sample Type	Sample Date	Sample Depth (ft) ^b	HEIS Sample Number	Sample Analysis
Soil	2/5/2015	22.5	B30C17	NWTPH-G, NWTPH-D, NWTPH-D+, EPH, PAH, and VOA
	2/5/2015	27.8	B30C21	
	2/5/2015	33.4	B30C23	
	2/5/2015	37.8	B30C26	
	2/5/2015	43.1	B30C28	
	2/5/2015	47.9	B30C32	
	2/9/2015	52.8	B30C34	
	2/9/2015	57.9	B30C36	
	2/9/2015	63.05	B30C38	
	2/9/2015	67.9	B30C40	
	2/12/2015	92	B30C42	
Soil - Duplicate of B30C17	2/5/2015	22.5	B30C19	
Equipment blank (associated with B30C28)	2/5/2015	NA	B30C30	
Trip blank	2/5/2015	NA	B30C24	VOA
Groundwater (nonfiltered)	2/11/2015	NA	B30C06	NWTPH-G, NWTPH-D, NWTPH-D+, EPH, PAH, VOA, anions, and gross beta
Groundwater (filtered)	2/11/2015	NA	B30C11	

^a The borehole was located at Washington State Plane Coordinates N149514.1, E571395.1.

^b Depth referenced below ground surface.

EPH = extractable petroleum hydrocarbons

HEIS = Hanford Environmental Information System

NA = not applicable

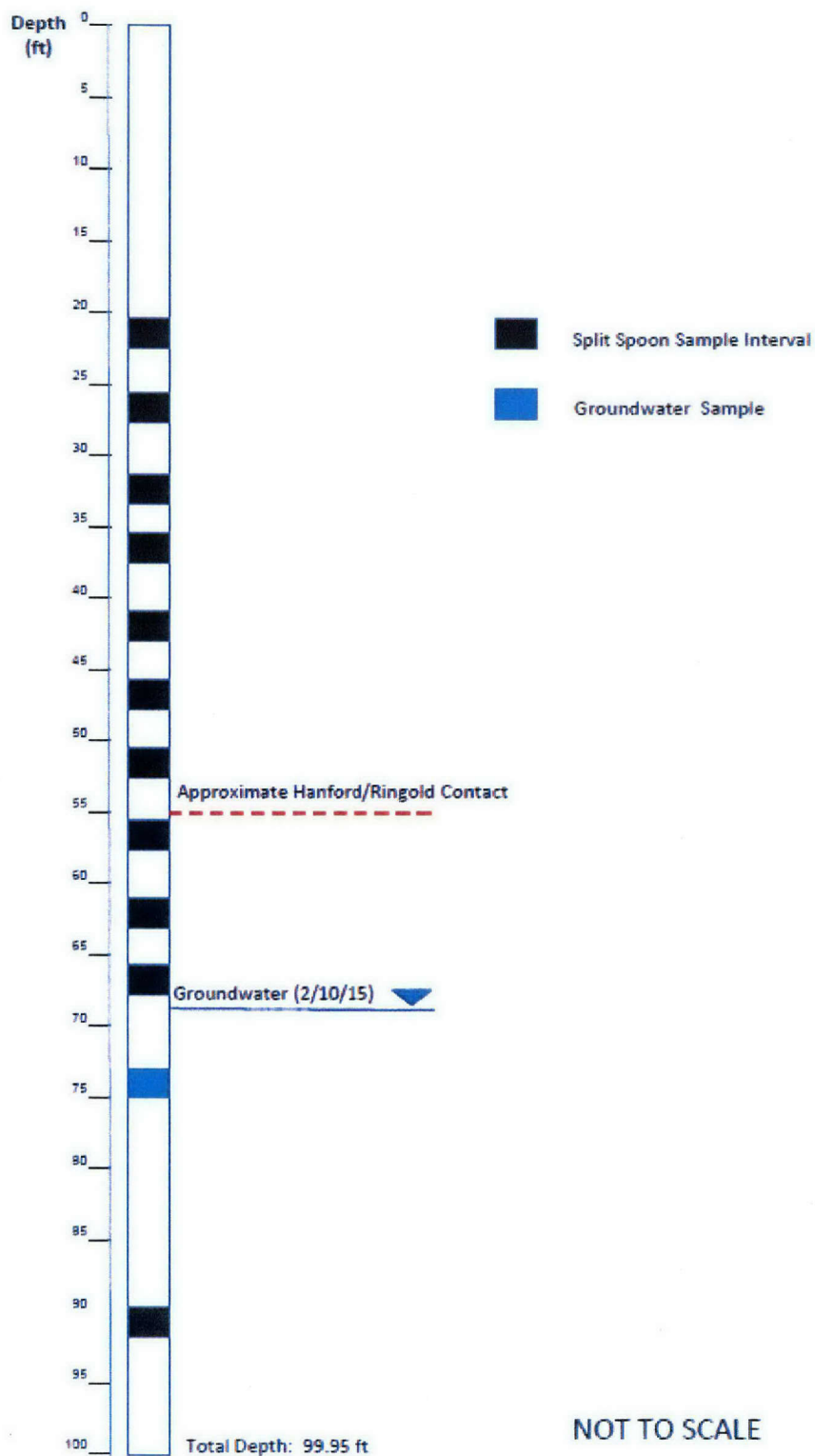
NWTPH-D = Northwest total petroleum hydrocarbons – diesel

NWTPH-D+ = Northwest total petroleum hydrocarbons – heavy oil range

NWTPH-G = Northwest total petroleum hydrocarbons – gasoline

PAH = polycyclic aromatic hydrocarbons

VOA = volatile organic analysis

Figure 10. The 100-N-85 Characterization Borehole Sample Intervals.

Field quality control samples that were collected included one duplicate soil sample, one trip blank, and one equipment blank sample. Grab samples were collected at 1.5-m (5-ft) intervals and inspected by the field geologist for geologic logging purposes. The borehole geologic log and well summary sheet is provided in Appendix C. At the completion of drilling, the borehole was logged using high-resolution spectral gamma ray and neutron moisture sonde. A summary of this logging is provided in Appendix C. This borehole information is also presented in *Borehole Summary Report for One Borehole at 100-N-85 Waste Site (1716-N Gas Station Fuel Tanks) FY 2015* (CH2M 2015).

Characterization Sample Results

All characterization samples were analyzed using EPA-approved analytical methods

Comparisons of the maximum detected results for each COPC from the 100-N-85 waste site borehole sample results against the RAGs are summarized in Table 3. Contaminants that were not detected by laboratory analysis are excluded from the table. The complete laboratory results for all constituents are stored in the Washington Closure Hanford project-specific database prior to archival in the Hanford Environmental Information System. The soil sample results are provided in Appendix A and the groundwater sample results are provided in Appendix B.

Table 3. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-N-85 Waste Site Borehole Characterization Soil Samples.

COPC	Maximum Result ^a (mg/kg)	Remedial Action Goals (mg/kg) ^b		Does the Result Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
TPH – motor oil range	4.01	200	200	No	--
Toluene	0.000768	100	160	No	--
Xylenes (total)	0.000393	160 ^c	NV	No	--
Anthracene	0.00478	240	1,920	No	--
Benzo(a)pyrene	0.000692	0.015 ^c	0.015 ^c	No	--
Benzo(b)fluoranthene	0.000663	0.015 ^c	0.015 ^c	No	--
Benzo(ghi)perylene	0.00143	48	192	No	--
Benzo(k)fluoranthene	0.000563	0.015 ^c	0.015 ^c	No	--
Dibenz(a,h)anthracene	0.000976	0.03 ^c	0.03 ^c	No	--
Indeno(1,2,3-cd)pyrene	0.000887	0.33 ^d	0.33 ^d	No	--

^a Maximum result for borehole characterization soil samples; data provided in Appendix A.

^b Remedial action goals obtained from the 100-N Area RDR/RAWP (DOE-RL 2013), unless noted otherwise.

^c Remedial action goal obtained from the 100 Area RDR/RAWP (DOE-RL 2009).

^d Where cleanup levels are less than RDLS, cleanup levels default to RDLs per WAC 173-340-707(2).

-- = not applicable

COPC = contaminant of potential concern

NV = no value

RAG = remedial action goal

RDL = required detection limit

RDR/RAWP = remedial design report/remedial action work plan

RESRAD = RESidual RADioactivity (dose model)

TPH = total petroleum hydrocarbons

WAC = Washington Administrative Code

VERIFICATION SAMPLE DATA EVALUATION

This section demonstrates that the 100-N-85 waste site achieves the applicable RAGs developed to support unrestricted land use at the 100-N Area, as established in the 100-N Area ROD (EPA 1999) and documented in the 100-N Area RDR/RAWP (DOE-RL 2013).

Attainment of Nonradionuclide RAGs

Table 3 compares the characterization sampling values to the applicable soil RAGs for protection of groundwater and protection of the Columbia River. Evaluation of the results indicates that all COPCs were quantified below groundwater and/or river protection soil RAGs. Therefore, residual concentrations are predicted to be protective of groundwater and, thus, the Columbia River.

Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6} , and a cumulative carcinogenic risk of less than 1×10^{-5} . For the 100-N-85 waste site, these risk values were not calculated since the site consists of soil located at a depth greater than 4.6 m (15 ft) bgs and there is no direct exposure pathway.

Nonradionuclide Groundwater Hazard Quotient and Carcinogenic Risk RAGs Attained

Calculation of risk values for groundwater at the 100-N-85 waste site was not performed because the borehole investigation resulted in collection of groundwater samples for laboratory analysis. Contamination associated with this waste site was not identified in the groundwater samples.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the characterization sampling approach (WCH 2014) and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 100-N-85 waste site established that the data are of the right type, quality, and quantity to support site closeout decisions. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The sample analytical data are stored in a Washington Closure Hanford project-specific database for data evaluation prior to archival in the Hanford Environmental Information System and are summarized in Appendix A. The detailed DQA is presented in Appendix D.

SUMMARY FOR INTERIM CLOSURE

The 100-N-85 waste site has been evaluated in accordance with the 100-N Area ROD (EPA 1999) and the 100-N Area RDR/RAWP (DOE-RL 2013). Characterization sampling was performed and the analytical results indicate that the residual concentrations of COPCs at the site meet the remedial action objectives for groundwater protection and river protection.

In accordance with this evaluation, the characterization sampling results support a reclassification of the 100-N-85 waste site to Interim Closed Out. Institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

REFERENCES

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DOE-RL, 2006, *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites*, DOE/RL-2005-92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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- WAC 173-340, 1996, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*.
- WCH, 2010, "100-N Remaining Site for Remedial Action," CCN 151698 to S. W. Callison from M. L. Proctor, Washington Closure Hanford, Richland, Washington, June 24.
- WCH, 2014, *Sampling and Analysis Instruction for Installation of the 100-N-85, 1716-N Gas Station Fuel Tanks Characterization Borehole*, WCH-604, Rev. 0, Washington Closure Hanford, Richland, Washington.
- WHC, 1993, *100-N Area Underground Storage Tank Closures*, WHC-SD-EN-TI-136, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

CALCULATIONS

APPENDIX A

CALCULATIONS

The calculations in this appendix are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the files will be stored in a U.S. Department of Energy, Richland Operations Office repository. The calculations have been prepared in accordance with ENG-1, *Engineering Services*, ENG-1-4.5, "Project Calculations," Washington Closure Hanford, Richland, Washington. The following calculations are provided in this appendix:

100-N-85 Waste Site Relative Percent Difference (RPD) Calculations, 0100N-CA-V0293, Rev. 0, Washington Closure Hanford, Richland, Washington.

DISCLAIMER FOR CALCULATIONS

The calculations provided in this appendix have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents.

Acrobat 8.0

CALCULATION COVER SHEETProject Title: 100-N Closure OperationsJob No. **14655**Area: 100-NDiscipline: Environmental*Calculation No: 0100N-CA-V0293Subject: 100-N-85 Waste Site Relative Percent Difference (RPD) CalculationsComputer Program: ExcelProgram No: Excel 2010

The attached calculations have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒Preliminary ☐Superseded ☐Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 3 Attachment = 5 Total = 9	J. D. Skoglie	I. B. Berezovskiy	R. J. Nielson	S. G. Wilkinson	9/24/15

SUMMARY OF REVISION

WCH-DE-018 (05/08/2007)

*Obtain Calc. No. from Document Control and Form from Intranet

Washington Closure Hanford			CALCULATION SHEET				
Originator:	J. D. Skoglie	Date:	6/9/2015	Calc. No.:	0100N-CA-V0293	Rev.:	0
Project:	100-N Closure Operations	Job No:	14655	Checked:	I. B. Berezovskiy	Date:	6/9/2015
Subject:	100-N-85 Waste Site Relative Percent Difference (RPD) Calculations					Sheet No. 1 of 3	

PURPOSE:

Using sample data from Attachment 1 provide documentation to support the calculation of the relative percent difference (RPD) for primary-duplicate sample pairs from 100-N-85 waste site verification sampling, as necessary.

GIVEN/REFERENCES:

- DOE-RL, 2006, *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites*, DOE/RL-2005- 92, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013, U.S. Environmental Protection Agency, Washington, D.C.
- WCH, 2015, *Remaining Sites Verification Package for the 100-N-85, 1716-N Gas Station Fuel Tanks Waste Site*, Attachment to Waste Site Reclassification Form 2015-024, Washington Closure Hanford, Richland, Washington.

SOLUTION:

- Use data from Attachment 1 to perform the RPD calculations for primary-duplicate sample pairs, as required.

METHODOLOGY:

The 100-N-85 waste site underwent verification focused sampling at eleven locations including two duplicate samples.

- The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed for certain analytes in Table II-1 of the SAP (DOE-RL 2006). Other analytes will have their own pre-determined constituents and will have their own TDLs based on the laboratory and method used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

$$RPD = [|M-D| / ((M+D)/2)] * 100$$

where, M = main sample value D = duplicate sample value

Washington Closure Hanford		CALCULATION SHEET			
Originator:	J. D. Skoglie	Date:	6/9/2015	Calc. No.:	0100N-CA-V0293
Project:	100-N Closure Operations	Job No:	14655	Checked:	I. B. Berezovski
Subject:	100-N-85 Waste Site Relative Percent Difference (RPD) Calculations				Rev.: 0 Date: 6/9/2015 Sheet No. 2 of 3

When an analyte is detected in the primary or duplicate sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. This assessment is provided in the data quality assessment section of the RSVP.

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. For regulatory splits, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment section of the applicable RSVP (WCH 2015), as necessary.

RESULTS:

- 1) The evaluation of the QA/QC duplicate RPD calculations are performed within the data quality assessment section of the RSVP.

Table 1 shows the results of the RPD calculations for the 100-N-85 waste site.

Washington Closure Hanford

CALCULATION SHEET

Originator:	J. D. Skoglie	Date:	6/9/2015	Calc. No.:	0100N-CA-V0293	Rev.:	0
Project:	100-N Closure Operations	Job No:	14655	Checked:	I. B. Berezovski	Date:	6/9/2015
Subject:	100-N-85 Waste Site Relative Percent Difference (RPD) Calculations					Sheet No.	3 of 3

Table 1. Relative Percent Difference Calculations for the 100-N-85 Waste Site.

Duplicate Analysis - 100-N-85 Waste Site

Sampling Area	Sample Number	Sample Date	Aliphatic nC8-nC10		
			ug/kg	Q	PQL
22.5	B30C17	2/5/15	1070	JB	690
Duplicate of B30C17	B30C19	2/5/15	1220	JB	692

Analysis:

TDL		5000
Duplicate Analysis	Both > PQL?	Yes (continue)
	Both > 5xTDL?	No-Stop (acceptable)
	RPD	
	Difference > 2 TDL?	No - acceptable

Duplicate Analysis - 100-N-85 Waste Site

Sampling Area	Sample Number	Sample Date	Xylenes (total)		
			ug/kg	Q	PQL
22.5	B30C16	2/5/15	0.242	J	0.227
Duplicate of B30C16	B30C18	2/5/15	0.297	J	0.234

Analysis:

TDL		35
Duplicate Analysis	Both > PQL?	Yes (continue)
	Both > 5xTDL?	No-Stop (acceptable)
	RPD	
	Difference > 2 TDL?	No - acceptable

B = detected but below the reporting limit

Q = qualifier

J = estimate

RPD = relative percent difference

PQL = practical quantitation limit

TDL = target detection limit

CONCLUSION:

The calculations in Table 1 demonstrate that the 100-N-85 waste site meets the requirements for the RPDs, as identified in the SAP (DOE-RL 2006). The relative percent difference calculations are for use in the RSVP for this site.

Attachment 1. 100-N-85 Waste Site Verification Sample Results (TPH).

DEPTH (Ft.)	HEIS Number	Sample Date	Aliphatic nC8-nC10			Aliphatic nC10-nC12			Aliphatic nC12-nC16			Aliphatic nC16-nC21			Aliphatic nC21-nC34		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
22.5	B30C17	2/5/15	1070	JB	690	690	U	690	690	U	690	690	U	690	690	U	690
Duplicate of B30C17	B30C19	2/5/15	1220	JB	692	692	U	692	692	U	692	692	U	692	692	U	692
27.8	B30C21	2/5/15	1220	JB	691	691	U	691	691	U	691	691	U	691	691	U	691
33.4	B30C23	2/5/15	962	JB	691	691	U	691	691	U	691	691	U	691	691	U	691
37.8	B30C26	2/5/15	1320	JB	717	717	U	717	717	U	717	717	U	717	717	U	717
43.1	B30C28	2/5/15	1350	JB	688	688	U	688	688	U	688	688	U	688	688	U	688
47.9	B30C32	2/5/15	1210	JB	689	689	U	689	689	U	689	689	U	689	689	U	689
52.8	B30C34	2/9/15	1250	JB	684	684	U	684	684	U	684	684	U	684	684	U	684
57.9	B30C36	2/9/15	1370	JB	713	713	U	713	713	U	713	713	U	713	713	U	713
63.05	B30C38	2/9/15	1070	JB	688	688	U	688	688	U	688	688	U	688	688	U	688
67.9	B30C40	2/9/15	1330	JB	723	723	U	723	723	U	723	723	U	723	723	U	723
92	B30C42	2/12/15	2280	BTX	753	753	UX	753	753	UX	753	753	UX	753	753	UX	753
Equipment Blank	B30C30	2/5/15	1020	JB	666	666	U	666	666	U	666	1330	J	666	2290		666

DEPTH (Ft.)	HEIS Number	Sample Date	Aromatic nC8-nC10			Aromatic nC10-nC12			Aromatic nC12-nC16			Aromatic nC16-nC21			Aromatic nC21-nC34		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
22.5	B30C17	2/5/15	690	U	690	690	U	690	690	U	690	690	U	690	690	U	690
Duplicate of B30C17	B30C19	2/5/15	692	U	692	692	U	692	692	U	692	692	U	692	692	U	692
27.8	B30C21	2/5/15	691	U	691	691	U	691	691	U	691	691	U	691	691	U	691
33.4	B30C23	2/5/15	691	U	691	691	U	691	691	U	691	691	U	691	691	U	691
37.8	B30C26	2/5/15	717	U	717	717	U	717	717	U	717	717	U	717	717	U	717
43.1	B30C28	2/5/15	688	U	688	688	U	688	688	U	688	688	U	688	688	U	688
47.9	B30C32	2/5/15	689	U	689	689	U	689	689	U	689	689	U	689	689	U	689
52.8	B30C34	2/9/15	684	U	684	684	U	684	684	U	684	684	U	684	684	U	684
57.9	B30C36	2/9/15	713	U	713	713	U	713	713	U	713	713	U	713	713	U	713
63.05	B30C38	2/9/15	688	U	688	688	U	688	688	U	688	688	U	688	688	U	688
67.9	B30C40	2/9/15	723	U	723	723	U	723	723	U	723	723	U	723	723	U	723
92	B30C42	2/12/15	753	UX	753	753	UTX	753	753	UTX	753	753	UTX	753	1780	TX	753
Equipment Blank	B30C30	2/5/15	666	U	666	666	U	666	666	U	666	666	U	666	666	U	666

DEPTH (Ft.)	HEIS Number	Sample Date	TPH - diesel range			TPH - gasoline range			TPH - motor oil (high boiling)		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
22.5	B30C17	2/5/15	2250	U	2250	1730	UD	1730	2250	U	2250
Duplicate of B30C17	B30C19	2/5/15	2250	U	2250	1740	UD	1740	2250	U	2250
27.8	B30C21	2/5/15	2250	U	2250	1730	UD	1730	2250	U	2250
33.4	B30C23	2/5/15	2240	U	2240	1730	UD	1730	2240	U	2240
37.8	B30C26	2/5/15	2340	U	2340	1800	UD	1800	2340	U	2340
43.1	B30C28	2/5/15	2240	U	2240	1730	UD	1730	2240	U	2240
47.9	B30C32	2/5/15	2250	U	2250	1730	UD	1730	2250	U	2250
52.8	B30C34	2/9/15	2220	U	2220	1710	UD	1710	2220	U	2220
57.9	B30C36	2/9/15	2320	U	2320	1790	UD	1790	2580	J	2320
63.05	B30C38	2/9/15	2240	U	2240	1720	UD	1720	2240	U	2240
67.9	B30C40	2/9/15	2350	U	2350	1810	UD	1810	2350	U	2350
92	B30C42	2/12/15	2440	U	2440	1880	UD	1880	2440	U	2440
Equipment Blank	B30C30	2/5/15	2160	U	2160	1670	UD	1670	4010	J	2160

Grey cells indicate not applicable or data will not be used.

Acronyms and notes apply to all of the tables in this attachment.

Note: Data qualified with B, J, P, T, and/or X are considered acceptable values.

B = blank contamination (inorganic constituents)

HEIS = Hanford Environmental Information System

J = estimate

P = aroclor target analyte with greater than 25% difference between column analyses

PAH = polycyclic aromatic hydrocarbons

PQL = practical quantitation limit

Q = qualifier

RAG = remedial action goal

T = spike and/or spike duplicate sample recovery is outside control limits.

TPH = total petroleum hydrocarbons

U = undetected

VOA = volatile organic analysis

X (metals) = serial dilution indicates that physical and chemical interferences are present

Attachment 1
 Originator J. D. Skoglie
 Checked I. B. Berezovsky
 Calc. No. 0100N-CA-V0293

Sheet No. 1 of 5
 Date 06/09/15
 Job No. 14655
 Rev. No. 0

Attachment 1. 100-N-85 Waste Site Verification Sample Results (PAH).

CONSTITUENT	CLASS	22.5 - B30C17			Duplicate of B30C17 - B30C19			27.8 - B30C21			33.4 - B30C23			37.8 - B30C26		
		2/5/15			2/5/15			2/5/15			2/5/15			2/5/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	5.19	U	5.19	5.19	U	5.19	5.19	U	5.19	5.18	U	5.18	5.33	U	5.33
Acenaphthylene	PAH	5.19	U	5.19	5.19	U	5.19	5.19	U	5.19	5.18	U	5.18	5.33	U	5.33
Anthracene	PAH	1.73	U	1.73	1.73	U	1.73	1.73	U	1.73	1.73	U	1.73	1.78	U	1.78
Benzo(a)anthracene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Benzo(a)pyrene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Benzo(b)fluoranthene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Benzo(ghi)perylene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Benzo(k)fluoranthene	PAH	0.277	U	0.277	0.277	U	0.277	0.277	U	0.277	0.276	U	0.276	0.284	U	0.284
Chrysene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Dibenz[a,h]anthracene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Fluoranthene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Fluorene	PAH	5.19	U	5.19	5.19	U	5.19	5.19	U	5.19	5.18	U	5.18	5.33	U	5.33
Indeno(1,2,3-cd)pyrene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569
Naphthalene	PAH	5.19	U	5.19	5.19	U	5.19	5.19	U	5.19	5.18	U	5.18	5.33	U	5.33
Phenanthrene	PAH	5.19	U	5.19	5.19	U	5.19	5.19	U	5.19	5.18	U	5.18	5.33	U	5.33
Pyrene	PAH	0.553	U	0.553	0.553	U	0.553	0.554	U	0.554	0.553	U	0.553	0.569	U	0.569

CONSTITUENT	CLASS	43.1 - B30C28			47.9 - B30C32			52.8 - B30C34			57.9 - B30C36			63.05 - B30C38		
		2/5/15			2/5/15			2/9/15			2/9/15			2/9/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	5.18	U	5.18	5.18	U	5.18	5.11	U	5.11	5.35	U	5.35	5.16	U	5.16
Acenaphthylene	PAH	5.18	U	5.18	5.18	U	5.18	5.11	U	5.11	5.35	U	5.35	5.16	U	5.16
Anthracene	PAH	4.78	J	1.73	1.73	U	1.73	1.70	U	1.70	1.78	U	1.78	1.72	U	1.72
Benzo(a)anthracene	PAH	0.552	U	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Benzo(a)pyrene	PAH	0.692	J	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Benzo(b)fluoranthene	PAH	0.663	J	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Benzo(ghi)perylene	PAH	1.43	J	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Benzo(k)fluoranthene	PAH	0.563	JP	0.276	0.276	U	0.276	0.272	U	0.272	0.285	U	0.285	0.275	U	0.275
Chrysene	PAH	0.552	U	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Dibenz[a,h]anthracene	PAH	0.976	J	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Fluoranthene	PAH	0.552	U	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Fluorene	PAH	5.18	U	5.18	5.18	U	5.18	5.11	U	5.11	5.35	U	5.35	5.16	U	5.16
Indeno(1,2,3-cd)pyrene	PAH	0.887	J	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551
Naphthalene	PAH	5.18	U	5.18	5.18	U	5.18	5.11	U	5.11	5.35	U	5.35	5.16	U	5.16
Phenanthrene	PAH	5.18	U	5.18	5.18	U	5.18	5.11	U	5.11	5.35	U	5.35	5.16	U	5.16
Pyrene	PAH	0.552	U	0.552	0.553	U	0.553	0.545	U	0.545	0.570	U	0.570	0.551	U	0.551

CONSTITUENT	CLASS	67.9 - B30C40			92 - B30C42			Equipment Blank - B30C30		
		2/9/15			2/12/15			2/5/15		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	5.10	U	5.10	5.65	UT	5.65	4.98	U	4.98
Acenaphthylene	PAH	5.10	U	5.10	5.65	UT	5.65	4.98	U	4.98
Anthracene	PAH	1.70	U	1.70	1.88	UT	1.88	7.67	J	1.66
Benzo(a)anthracene	PAH	0.544	U	0.544	0.603	UT	0.603	1.13	J	0.532
Benzo(a)pyrene	PAH	0.544	U	0.544	0.603	UT	0.603	0.73	J	0.532
Benzo(b)fluoranthene	PAH	0.544	U	0.544	0.603	UT	0.603	0.953	J	0.532
Benzo(ghi)perylene	PAH	0.544	U	0.544	0.603	UT	0.603	1.02	J	0.532
Benzo(k)fluoranthene	PAH	0.272	U	0.272	0.301	UT	0.301	0.726	JP	0.266
Chrysene	PAH	0.544	U	0.544	0.603	UT	0.603	0.532	U	0.532
Dibenz[a,h]anthracene	PAH	0.544	U	0.544	0.603	UT	0.603	0.844	J	0.532
Fluoranthene	PAH	0.544	U	0.544	0.603	UT	0.603	0.532	U	0.532
Fluorene	PAH	5.10	U	5.10	5.65	UT	5.65	5.34	J	4.98
Indeno(1,2,3-cd)pyrene	PAH	0.544	U	0.544	0.603	UT	0.603	0.781	J	0.532
Naphthalene	PAH	5.10	U	5.10	5.65	UT	5.65	4.98	U	4.98
Phenanthrene	PAH	5.10	U	5.10	5.65	UT	5.65	7.28	J	4.98
Pyrene	PAH	0.544	U	0.544	0.603	UT	0.603	1.02	J	0.532

Attachment 1
 Originator J. D. Skoglie
 Checked I. B. Berezovskiy
 Calc. No. 0100N-CA-V0293

Sheet No. 2 of 5
 Date 06/09/15
 Job No. 14655
 Rev. No. 0

Attachment 1. 100-N-85 Waste Site Verification Sample Results (VOA).

CONSTITUENT	CLASS	22.5 - B30C16				Duplicate of B30C16 - B30C18				27.8 - B30C20				33.4 - B30C22				37.8 - B30C25			
		2/5/15		2/5/15		2/5/15		2/5/15		2/5/15		2/5/15		2/5/15		2/5/15		2/5/15			
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL		
1,1,1-Trichloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,1,2,2-Tetrachloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,1,2-Trichloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,1-Dichloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,1-Dichloroethene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,2-Dichloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,2-Dichloroethane(Total)	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
1,2-Dichloropropene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
2-Butanone	VOA	2.27	U	2.27	2.34	U	2.34	2.94	U	2.94	2.68	U	2.68	2.88	U	2.88	2.88	U	2.88		
2-Hexanone	VOA	2.27	U	2.27	2.34	U	2.34	2.94	U	2.94	2.68	U	2.68	2.88	U	2.88	2.88	U	2.88		
4-Methyl-2-Pentanone	VOA	2.27	U	2.27	2.34	U	2.34	2.94	U	2.94	2.68	U	2.68	2.88	U	2.88	2.88	U	2.88		
Acetone	VOA	2.27	U	2.27	2.34	U	2.34	2.94	U	2.94	2.68	U	2.68	2.88	U	2.88	2.88	U	2.88		
Benzene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Bromodichloromethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Bromoform	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Bromomethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Carbon disulfide	VOA	1.21	U	1.21	1.25	U	1.25	1.57	U	1.57	1.43	U	1.43	1.54	U	1.54	1.54	U	1.54		
Carbon tetrachloride	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Chlorobenzene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Chloroethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Chloroform	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Chloromethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Dibromochloromethane	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Ethylbenzene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Methylenechloride	VOA	1.21	U	1.21	1.25	U	1.25	1.57	U	1.57	1.43	U	1.43	1.54	U	1.54	1.54	U	1.54		
Styrene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Tetrachloroethene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Toluene	VOA	0.227	U	0.227	0.609	J	0.234	0.48	J	0.294	0.768	J	0.268	0.346	J	0.288	0.346	J	0.288		
Trichloroethene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Vinyl chloride	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
Xylenes (total)	VOA	0.242	J	0.227	0.297	J	0.234	0.294	U	0.294	0.393	J	0.268	0.288	U	0.288	0.288	U	0.288		
cis-1,2-Dichloroethylene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
cis-1,3-Dichloropropene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
trans-1,2-Dichloroethylene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		
trans-1,3-Dichloropropene	VOA	0.227	U	0.227	0.234	U	0.234	0.294	U	0.294	0.268	U	0.268	0.288	U	0.288	0.288	U	0.288		

Attachment 1

Originator

J. D. Skoglie

Sheet No.

3 of 5

Checked

I. B. Berezovsky

Date

06/09/15

Calc. No.

0100N CA-V0293

Job No.

14655

Rev. No.

0

Attachment 1. 100-N-85 Waste Site Verification Sample Results (VOA).

CONSTITUENT	CLASS	43.1 - B30C27				47.9 - B30C31				52.8 - B30C33				57.9 - B30C35				63.05 - B30C37			
		2/5/15		2/5/15		2/5/15		2/5/15		2/9/15		2/9/15		2/9/15		2/9/15		2/9/15		2/9/15	
		ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q
1,1,1-Trichloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,1,2,2-Tetrachloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,1,2-Trichloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,1-Dichloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,1-Dichloroethene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,2-Dichloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,2-Dichloroethene(Total)	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
1,2-Dichloropropane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
2-Butanone	VOA	2.88	U	2.88	U	2.83	U	2.83	U	2.32	U	2.32	U	1.84	U	1.84	U	2.38	U	2.38	U
2-Hexanone	VOA	2.88	U	2.88	U	2.83	U	2.83	U	2.32	U	2.32	U	1.84	U	1.84	U	2.38	U	2.38	U
4-Methyl-2-Pentanone	VOA	2.88	U	2.88	U	2.83	U	2.83	U	2.32	U	2.32	U	1.84	U	1.84	U	2.38	U	2.38	U
Acetone	VOA	2.88	U	2.88	U	2.83	U	2.83	U	2.32	U	2.32	U	1.84	U	1.84	U	2.38	U	2.38	U
Benzene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Bromodichloromethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Bromoform	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Bromomethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Carbon disulfide	VOA	1.54	U	1.54	U	1.51	U	1.51	U	1.24	U	1.24	U	0.983	U	0.983	U	1.27	U	1.27	U
Carbon tetrachloride	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Chlorobenzene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Chloroethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Chloroform	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Chloromethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Dibromochloromethane	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Ethylbenzene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Methyleneschloride	VOA	1.54	U	1.54	U	1.51	U	1.51	U	1.24	U	1.24	U	0.983	U	0.983	U	1.27	U	1.27	U
Styrene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Tetrachloroethene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Toluene	VOA	0.538	J	0.288	J	0.311	J	0.283	J	0.333	J	0.232	J	0.246	J	0.184	J	0.238	U	0.238	U
Trichloroethene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Vinyl chloride	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
Xylenes (total)	VOA	0.298	J	0.288	J	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
cis-1,2-Dichloroethylene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
cis-1,3-Dichloropropene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
trans-1,2-Dichloroethylene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U
trans-1,3-Dichloropropene	VOA	0.288	U	0.288	U	0.283	U	0.283	U	0.232	U	0.232	U	0.184	U	0.184	U	0.238	U	0.238	U

Sheet No. 4 of 5

Attachment 1

Originator J. D. Skogljie

Checked I. B. Berezovsky

Calc. No. 0100N-CA-V0293

Date 06/09/15

Job No. 14655

Rev. No. 0

Attachment 1. 100-N-85 Waste Site Verification Sample Results (VOA).

CONSTITUENT	CLASS	67.9 - B30C39				92 - B30C41				Equipment Blank - B30C29				Trip Blank - B30C24			
		2/9/15				2/12/15				2/5/15				2/5/15			
		ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q	ug/kg	Q	PQL	Q
1,1,1-Trichloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,1,2,2-Tetrachloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,1,2-Trichloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,1-Dichloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,1-Dichloroethene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,2-Dichloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.693	J	0.214	U
1,2-Dichloroethene(Total)	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
1,2-Dichloropropane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
2-Butanone	VOA	1.49	U	1.49	U	2.38	U	2.38	U	3.62	J	2.73	J	4.18	J	2.14	U
2-Hexanone	VOA	1.49	U	1.49	U	2.38	U	2.38	U	2.73	U	2.73	U	2.14	U	2.14	U
4-Methyl-2-Pentanone	VOA	1.49	U	1.49	U	2.38	U	2.38	U	2.73	U	2.73	U	2.14	U	2.14	U
Acetone	VOA	1.49	U	1.49	U	2.38	U	2.38	U	11.2		2.73		13.5		2.14	U
Benzene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Bromodichloromethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Bromoform	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Bromomethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Carbon disulfide	VOA	0.794	U	0.794	U	1.27	U	1.27	U	1.45	U	1.45	U	1.14	U	1.14	U
Carbon tetrachloride	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Chlorobenzene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Chloroethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Chloroform	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Chloromethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Dibromochloromethane	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Ethylbenzene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Methylenechloride	VOA	0.794	U	0.794	U	1.27	U	1.27	U	1.45	U	1.45	U	1.14	U	1.14	U
Styrene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Tetrachloroethene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Toluene	VOA	0.149	U	0.149	U	0.532	J	0.238	J	0.673	J	0.273	J	0.586	J	0.214	U
Trichloroethene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Vinyl chloride	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
Xylenes (total)	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.527	J	0.273	J	0.493	J	0.214	U
cis-1,2-Dichloroethylene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
cis-1,3-Dichloropropene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
trans-1,2-Dichloroethylene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U
trans-1,3-Dichloropropene	VOA	0.149	U	0.149	U	0.238	U	0.238	U	0.273	U	0.273	U	0.214	U	0.214	U

Sheet No. 5 of 5

Attachment 1

Date 06/09/15

Originator J. D. Skoglie

Job No. 14655

Checked I. B. Berezovsky

Rev. No. 0

Calc. No. 0100N-CA-V0293

APPENDIX B

GROUNDWATER SAMPLING RESULTS

Table B-1. 100-N-85 Groundwater Sample Results. (2 Pages)

Constituent	Unfiltered Sample			Filtered Sample		
	2/11/2015			2/11/2015		
	ug/L	Q	PQL	ug/L	Q	PQL
Volatile Organic Analysis	Sample # B30C04			Sample # B30C09		
1,1,1-Trichloroethane	0.3	U	0.3	0.3	U	0.3
1,1,2,2-Tetrachloroethane	0.3	U	0.3	0.3	U	0.3
1,1,2-Trichloroethane	0.3	U	0.3	0.3	U	0.3
1,1-Dichloroethane	0.3	U	0.3	0.3	U	0.3
1,1-Dichloroethene	0.3	U	0.3	0.3	U	0.3
1,2-Dichloroethane	0.3	U	0.3	0.3	U	0.3
1,2-Dichloropropane	0.3	U	0.3	0.3	U	0.3
2-Butanone	3	TU	3	3	TU	3
2-Hexanone	3	U	3	3	U	3
4-Methyl-2-Pentanone	3	U	3	3	U	3
Acetone	3	TU	3	3	TU	3
Benzene	0.3	U	0.3	0.3	U	0.3
Bromodichloromethane	0.3	U	0.3	0.3	U	0.3
Bromoform	0.3	U	0.3	0.3	U	0.3
Bromomethane	0.3	U	0.3	0.3	U	0.3
Carbon disulfide	1.6	U	1.6	1.6	U	1.6
Carbon tetrachloride	0.3	U	0.3	0.3	U	0.3
Chlorobenzene	0.3	U	0.3	0.3	U	0.3
Chloroethane	0.3	U	0.3	0.3	U	0.3
Chloroform	1.89	J	0.3	1.91	J	0.3
Chloromethane	0.3	U	0.3	0.3	U	0.3
cis-1,3-Dichloropropene	0.3	U	0.3	0.3	U	0.3
Dibromochloromethane	0.3	U	0.3	0.3	U	0.3
Ethylbenzene	0.3	U	0.3	0.3	U	0.3
Methylenechloride	1.6	U	1.6	1.6	U	1.6
Styrene	0.3	U	0.3	0.3	U	0.3
Tetrachloroethene	0.3	U	0.3	0.3	U	0.3
Toluene	0.3	U	0.3	0.3	U	0.3
trans-1,3-Dichloropropene	0.3	U	0.3	0.3	U	0.3
Trichloroethene	0.3	U	0.3	0.3	U	0.3
Vinyl chloride	0.3	U	0.3	0.3	U	0.3
Xylenes (total)	0.3	U	0.3	0.3	U	0.3
Polycyclic Aromatic Hydrocarbons	Sample # B30C05			Sample # B30C10		
Acenaphthene	0.146	U	0.146	0.15	U	0.15
Acenaphthylene	0.146	U	0.146	0.15	U	0.15
Anthracene	0.146	U	0.146	0.15	U	0.15
Benzo(a)anthracene	0.0155	U	0.0155	0.016	U	0.016
Benzo(a)pyrene	0.0155	U	0.0155	0.016	U	0.016
Benzo(b)fluoranthene	0.0155	U	0.0155	0.016	U	0.016
Benzo(ghi)perylene	0.0155	U	0.0155	0.016	U	0.016
Benzo(k)fluoranthene	0.00777	U	0.0078	0.008	U	0.008
Chrysene	0.0155	U	0.0155	0.016	U	0.016
Dibenz[a,h]anthracene	0.0155	U	0.0155	0.016	U	0.016
Fluoranthene	0.0155	U	0.0155	0.016	U	0.016
Fluorene	0.146	U	0.146	0.15	U	0.15
Indeno(1,2,3-cd)pyrene	0.0155	U	0.0155	0.016	U	0.016
Naphthalene	0.146	U	0.146	0.15	U	0.15
Phenanthrene	0.177	U	0.177	0.182	U	0.182
Pyrene	0.0155	U	0.0155	0.016	U	0.016

Table B-1. 100-N-85 Groundwater Sample Results. (2 Pages)

Constituent	Unfiltered Sample			Filtered Sample		
	2/11/2015			2/11/2015		
	mg/L	Q	PQL	mg/L	Q	PQL
Anions	Sample # B30C06			Sample # B30C11		
Bromide	0.3		0.067	0.261		0.067
Chloride	168	D	3.35	168	D	3.35
Fluoride	0.164	B	0.033	0.163	B	0.033
Nitrogen in Nitrate	13.8	D	0.33	13.9	D	0.33
Nitrogen in Nitrite	0.038	U	0.038	0.038	U	0.038
Phosphorous in Phosphate	0.067	U	0.067	0.067	U	0.067
Sulfate	113	D	1.33	113	D	1.33
Petroleum Hydrocarbons	Sample # B30C05			Sample # B30C10		
	ug/L	Q	PQL	ug/L	Q	PQL
TPH Gasoline Range	16.7	U	16.7	16.7	U	16.7
TPH Diesel Range	50	U	50	47.6	U	47.6
TPH Motor Oil Range	50	U	50	47.6	U	47.6
Aliphatic Hydrocarbons C8-C10	15	U	15	15	U	15
Aliphatic Hydrocarbons >C10-C-12	15	U	15	15	U	15
Aliphatic Hydrocarbons >C12-C16	15	U	15	15	U	15
Aliphatic Hydrocarbons >C16-C21	15	U	15	15	U	15
Aliphatic Hydrocarbons >C21-C24	15	U	15	15	U	15
Aromatic Hydrocarbons C8-10	15	U	15	15	U	15
Aromatic Hydrocarbons >C10-C-12	15	U	15	15	U	15
Aromatic Hydrocarbons >C12-C16	15	U	15	15	U	15
Aromatic Hydrocarbons >C16-C21	15	U	15	15	U	15
Aromatic Hydrocarbons >C21-C24	15	U	15	15	U	15
Radionuclides	Sample # B30C08			Sample # B30C03		
	pCi/L	Q	PQL	pCi/L	Q	PQL
Gross Beta	16.57		8.38	12.217		6.7

Acronyms/Abbreviations

- B = detected at a value < RDL, but \geq to IDL/MDL
 D = diluted
 IDL = instrument detection limit
 J = estimate
 MDL = method detection limit
 PQL = practical quantitation limit
 RDL = required detection limit
 T = spike and/or spike duplicate sample recovery outside control limits
 TPH = total petroleum hydrocarbons
 U = undetected

APPENDIX C

**BOREHOLE LOG, WELL SUMMARY SHEET, AND
GEOPHYSICAL LOGGING REPORT**

BOREHOLE LOG					Page 1 of 4
					Date: 2/3/15
Well ID: 19410		Well Name: 194-N-375		Location: South of N Reactor	
Project: Gas tank fuel characterization 100-N				Reference Measuring Point: Ground surface	
Depth (ft)	Sample		Graphic Log	Sample Description	Comments
	Type No.	Blows Recovery			
0				6-12 ft bgs	Cable tool 22 in
				Backfill (msa)	w/ 8 3/8" drive barrel
5	gs			20% silt 50% sand 30% gravel	
				Sand is fine to coarse grained	gs = grab sample
				5% angular poorly sorted	grab samples are
				Gravel rounded to well rounded	collected from the drive
				range is size 2mm to 200mm	barrel and saved for archive
				30% mafic 20% felsic	
				Large mass (4) silt/clay to 2-6 ft bgs	SS = split spoon
				Strong reaction to HCl - damp	samples collected by
					MO's
10	gs				
				12-16.60 ft bgs	
				Backfill (SS)	drilling shows close to
				5% silt 10% sand 75% gravel	change in sediment
				Sand: fine to coarse grain, sub	composition
				ang. poorly sorted. Gravel	
				2mm to 200mm well rounded	T-001 Dup 2-5-B
				well rounded. 80% mafic 20%	B30C16, B30C17 22.5'
				Felsic. slightly damp and reaction to HCl	B30C18, B30C19
					E-002 B30C20 B30C21 23.5'
					T-003 33-40'
				16.70 - 24 ft bgs (gs)	B30C22 B30C23
				Backfill w/ Hanford	B30C24 (MS)
				5% silt 75% sand 10% gravel	
				coarse grain, moderately well sorted	E-004 37.5'
				sub angular sand - highly mafic ~90%	B30C25 B30C26
				Gravel is small 2mm to 200mm	
				subangular to sub round. poorly sorted	
				weak to no reaction to HCl. Dry slightly	
				moist 10-20% black	
				24-30 ft bgs (gs)	
				Hanford	
				5% silt 80% sand 15% Gravel	
				coarse grain sand med. sorted	
				sub angular. Gravel sub round	
				to round. highly mafic ~90%	
				No reaction to HCl. Moist 20mm to	
Reported By: Candice Burnette Kildall				Reviewed By: Kevin Bergstrom	
Title: Geologist				Title: Sr Geologist	
Signature: [Signature]		Date: 2/3/15		Signature: [Signature] Date: 3-11-2015	

A-6003-642 (03/05)

BOREHOLE LOG					Page 2 of 4
					Date: 2-5-15
Well ID: C9410		Well Name: 199-N-375		Location: South of N Reactor	
Project: Gas tank characterization borehole				Reference Measuring Point: Ground Surface	
Depth (ft.)	Sample Type No.	Blows Recovery	Graphic Log	Sample Description	Comments
				Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
10	15	40		150 mm 2 10YR 2/1 black	Cable tool rig 22" w/ 8 3/4" drive barrel
15	15	40		30 ft - 53.8 ft bags (SG)	grab sample for analysis
20	15	40		Hanford	from the drive barrel for archive
25	15	40		5% silt 65% sand 30% gravel	
30	15	40		very coarse grain sand sub angular	
35	15	40		mod. sorting ~ 5% felsic material	
40	15	40		lead to be slightly less coarse	Split Spoon Samples
45	15	40		Gravel is highly mafic ~ 40% sub round	I-005 43.10'
50	15	40		to round poorly sorted	B30C27 B30C28
55	15	40		Overall the sample is 97% mafic	B30C29 B30C30
60	15	40		89% felsic, no reaction to HCl	I-006 47.9 ft
65	15	40		10YR 2/1 Black wet/damp	B30C31 B30C32
70	15	40		53.8-65 ft bags (msb)	I-007 52.8 ft
75	15	40		Hanford / subgrade gravel contact	B30C33 B30C34
80	15	40		15% silt 40% sand 45% gravel	I-008 57.9 ft
85	15	40		Sand is medium grain well sorted	B30C35 B30C36
90	15	40		felsic sand ~ 75% silt and	T-009 B30C37 B30C38
95	15	40		gravel sub ang to sub round	163.05 ft bags
100	15	40		70% mafic 30% felsic gravels	7-007-7-008 67.9 ft bags
105	15	40		7.5 YR 2/1 Gravel Drilling indicates	B30C39 B30C40
110	15	40		that the gravel may be slightly	SS has H2O (saturated)
115	15	40		rounded but could be reaction to HCl	too H2O 2-10-15
120	15	40		Dry	68.9 ft bags
125	15	40		55-70 ft bags (SG)	Water sample collected
130	15	40		Range Rinsed	74.90 ft bags
135	15	40		5% silt 50% sand 45% gravel	filtered
140	15	40		sand med to coarse grain med sort	B30C03 B30C04
145	15	40		sub ang to angular ~ 75% felsic	B30C05
150	15	40		Gravel sub ang to rounded	Unfiltered
155	15	40		70% mafic 30% felsic poorly sorted	B30C06 B30C09
160	15	40		Gravel is size ~ 7 mm to 10 mm	B30C06
165	15	40		No reaction to HCl, Damp/wet	perm rate 1.9 gpm
170	15	40		10YR 6/3 Pale brown	

Reported By: <u>Geologic Baseline Kildall/Johnston</u>	Reviewed By: <u>Kevin Bergstrom</u>
Title: <u>Geologist/Geologist</u>	Title: <u>Sr Geologist</u>
Signature: <u>[Signature]</u> Date: <u>2/4/15</u>	Signature: <u>[Signature]</u> Date: <u>3-11-2015</u>

A-6003-642 (03/03)

A 6005-642 (03/03)

A 6003-642 (03/03)

A-6003-643 (03/03)

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199-N-375 (C9410) Log Data Report

Borehole Information:

Log Date:	2015-02-19	Filename:	C9410_HG-NM_2015-02-19	Site:	100 N
Coordinates (WA St Plane)		DTW ¹ (ft):	69	DTW Date:	02/18/15
North (m)	East (m)	Drill Date	TOC ² Elevation	Total Depth (ft)	Type
N/A	N/A	02/17/15	N/A	99.95	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Diameter (in.)		Thickness (in.)	Top (ft)	Bottom (ft)
		Outer	Inside			
Threaded Steel	5.0	10 3/4	9 3/4	1/2	5.0	99.23

Borehole Notes:

The onsite geologist provided the total depth and casing depth. The logging engineer measured casing stick-up and casing diameter (rounded to the nearest 1/16-in.). Depth to water inside the casing was estimated by the driller and confirmed by logging. The maximum logging depth achieved was 99 ft.

Zero reference is ground surface.

Logging Equipment Information:

Logging System:	Gamma 1L	Type:	60% HPGe SGLS ³
Effective Calibration Date:	11/12/14	Serial No.:	47-TP32211A
Calibration Reference:	HGLP-CC-111, Rev. 0	Logging Procedure:	HGLP-MAN-002, Rev. 1

Logging System:	Gamma 1H	Type:	NMLS ⁴
Effective Calibration Date:	11/13/14	Serial No.:	H310700352
Calibration Reference:	HGLP-CC-112, Rev. 0	Logging Procedure:	HGLP-MAN-002, Rev. 1

SGLS Log Run Information:

Log Run	3	4 Repeat			
HEIS Number	1018635	1018636			
Date	02/19/15	02/19/15			
Logging Engineer	Pope/Meisner	Pope/Meisner			
Start Depth (ft)	0.0	98.0			
Finish Depth (ft)	99.0	88.0			
Count Time (sec)	100	100			
Live/Real	R	R			

¹ depth to water inside casing² top of casing³ Spectral Gamma Logging System⁴ Neutron Moisture Logging System

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Log Run	3	4 Repeat			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	AL237CAB	AL237CAB			
Start File	AL237000	AL237100			
Finish File	AL237099	AL237110			
Post-Verification	AL237CAA	AL237CAA			
Depth Return Error (in.)	N/A	0.0			
Comments	No fine gain adjustments made	No fine gain adjustments made			

NMLS Log Run Information:

Log Run	1	2 Repeat			
HEIS Number	1018637	1018638			
Date	02/18/15	02/18/15			
Logging Engineer	Pope/Meisner	Pope/Meisner			
Start Depth (ft)	0.0	69.5			
Finish Depth (ft)	70.0	62.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	AH196CAB	AH196CAB			
Start File	AH196000	AH196281			
Finish File	AH196280	AH196311			
Post-Verification	AH196CAA	AH196CAA			
Depth Return Error (in.)	N/A	0.5 low			
Comments	None	None			

Logging Operation Notes:

A centralizer was installed on the sondes.

Pre- and post-survey verification measurements met the acceptance criteria for the established systems.

Analysis Notes:

Analyst:	P.D. Henwood	Date:	02/25/15	Reference:	HGLP-MAN-003, Rev. 0
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A casing correction for a 1/2-in. thick casing was applied to the log data.

A correction for water was applied below 69 ft in depth.

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SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated in an EXCEL template identified as 1L20141112, using an efficiency function and corrections for casing and dead time as determined by annual calibrations.

NMLS data are reported in count per second.

The HGU⁵ is an empirical unit of gamma activity proposed as a means to standardize gamma log response across multiple logging systems with different response characteristics. The HGU is defined in terms of measurements in the Hanford Borehole Calibration Facility, and the magnitude is selected such that 1 HGU is approximately equivalent to typical Hanford background activity, based on data from background samples as reported in *Hanford Site Background: Part 2, Soil Background for Radionuclides* (DOE/RL-96-12).

Results and Interpretations:

No manmade radionuclides were detected in the borehole. MDLs for Cs-137 and Pu-239 are plotted for the entire borehole.

The neutron moisture log primarily responds to moisture present in the surrounding formation. In general, an increase in count rate reflects an increase in moisture content. Moisture content may increase in sediments of relatively high silt or clay content.

The KUT and moisture repeat plots indicate that the respective systems were working properly.

List of Log Plots:

Depth Reference is ground surface.

Manmade Radionuclides (0-160 ft)

Natural Gamma Logs (0-160 ft)

Combination Plot (0-120 ft)

Total Gamma & Moisture (0-160 ft)

Total Gamma & Hanford Gamma Unit (0-160 ft)

Repeat Section of Natural Gamma Logs (88 to 98 ft)

Moisture Repeat Section (62 to 70 ft)

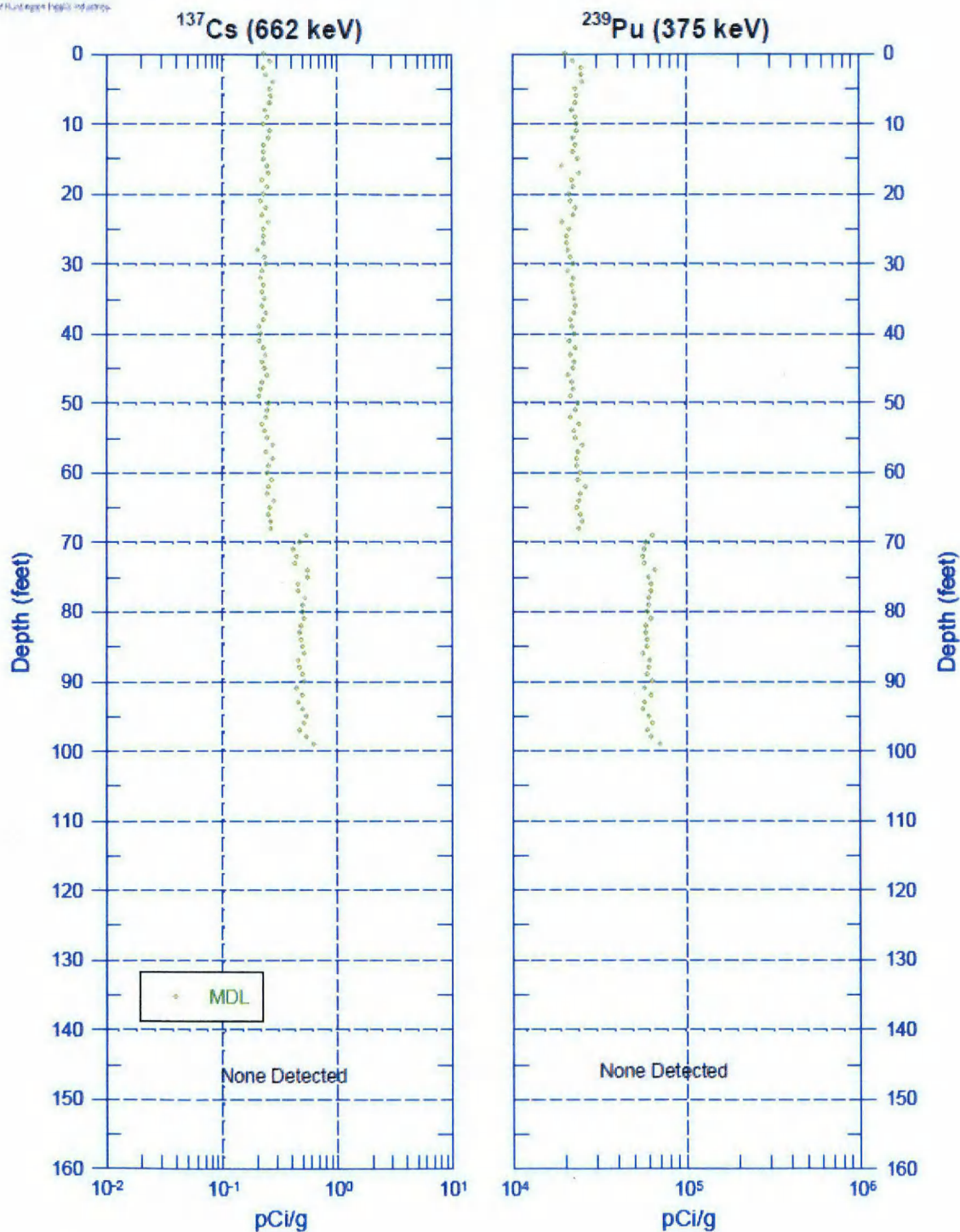
⁵ Hanford Gamma Unit

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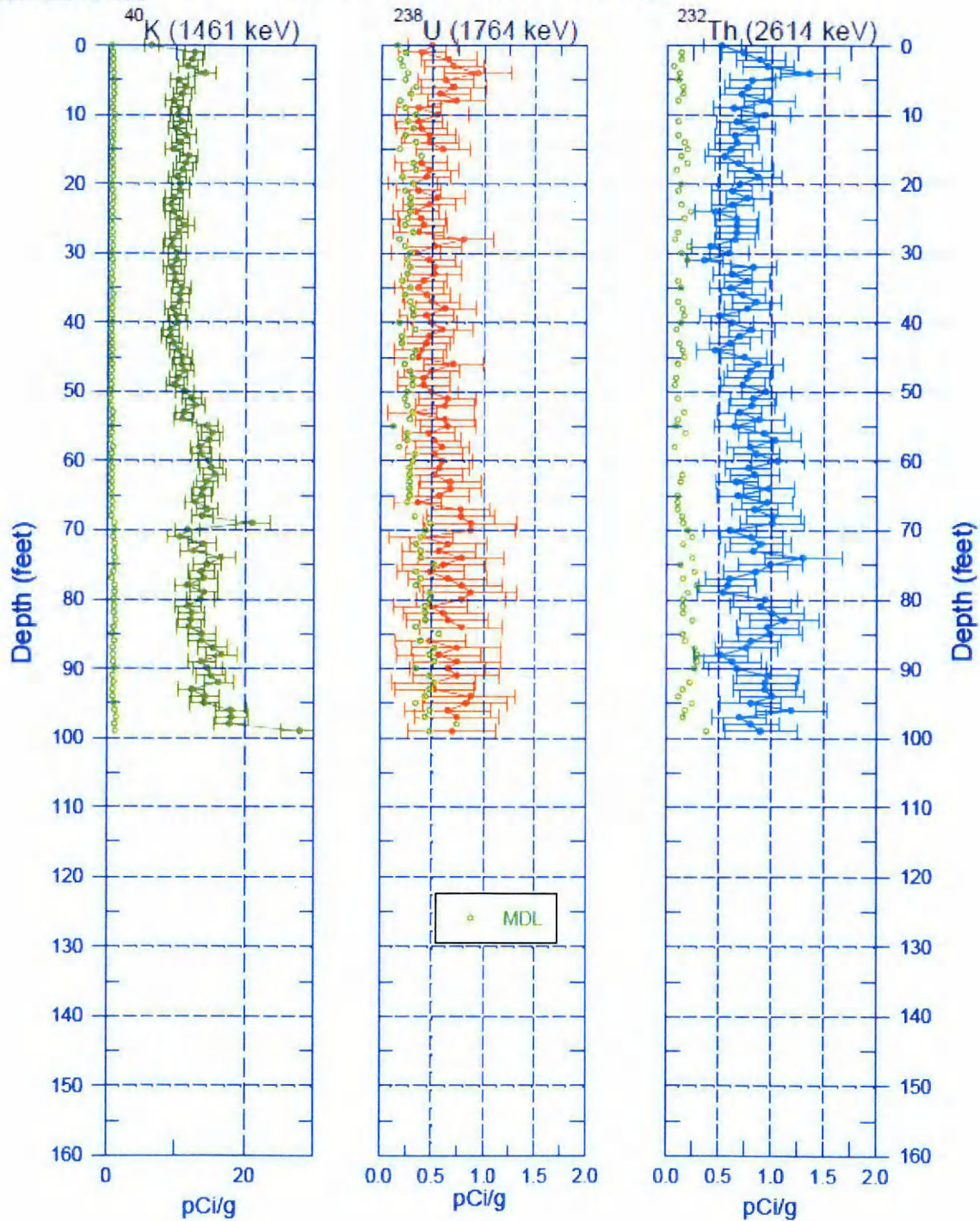
199-N-375 (C9410) Manmade Radionuclides



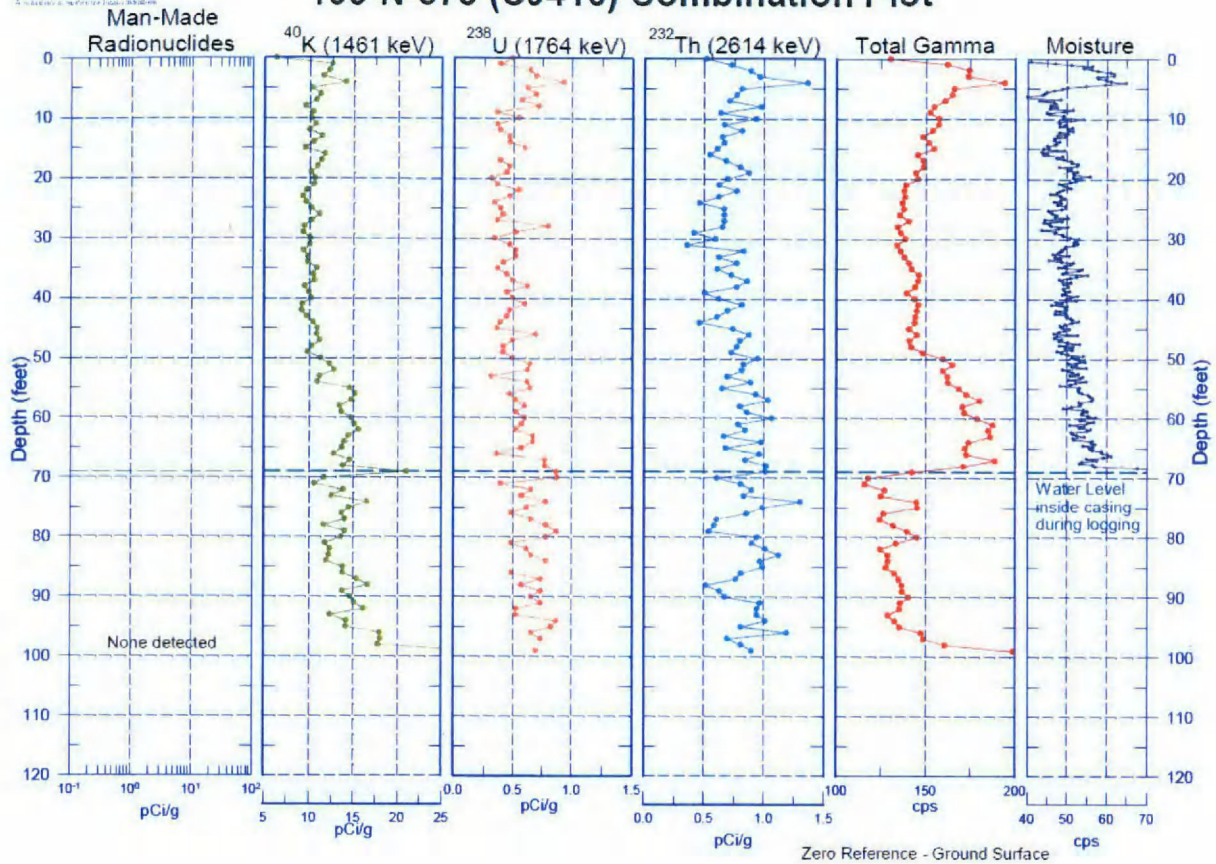
Zero Reference - Ground Surface

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199-N-375 (C9410) Natural Gamma Logs



Zero Reference - Ground Surface

HGLP-LDR-822, Rev. 0
Page 6 of 10**199-N-375 (C9410) Combination Plot**

APPENDIX D
DATA QUALITY ASSESSMENT

APPENDIX D

DATA QUALITY ASSESSMENT

CHARACTERIZATION SAMPLING

A data quality assessment (DQA) was performed to compare the characterization sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2014). This DQA was performed in accordance with site-specific data quality objectives found in the *100-N Area Sampling and Analysis Plan for CERCLA Waste Sites* (100-N Area SAP) (DOE-RL 2006).

A review of the sample design (WCH 2014) and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design. To ensure quality data, the 100-N Area SAP (DOE-RL 2006) data assurance requirements and the data validation procedures for chemical analysis (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Characterization sample data collected at the 100-N-85 waste site were provided by the laboratories in sample delivery groups (SDGs): X0091, X0092, X0093, and X0097. SDG X0093 was submitted for third-party validation.

No Major deficiencies were identified in this data set. Minor deficiencies are discussed in the minor deficiencies section below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

MAJOR DEFICIENCIES

None.

MINOR DEFICIENCIES

SDG XP0091

This SDG is comprised of four characterization samples (B30C17, B30C19, B30C21, and B30C23) from the 100-N-85 borehole. Samples B30C17 and B30C19 comprise a field duplicate pair. All samples were analyzed for extractable petroleum hydrocarbons (EPH), Northwest total petroleum hydrocarbons - diesel range petroleum hydrocarbons (NWTPH-Dx), Northwest total petroleum hydrocarbons - gasoline range petroleum hydrocarbons (NWTPH-Gx), Northwest

total petroleum hydrocarbons -heavy oil range petroleum hydrocarbons (NWTPH-Dx+), and polycyclic aromatic hydrocarbons (PAH). Minor deficiencies are as follows.

In the EPH analysis, the laboratory control sample (LCS) recoveries for the initial analysis had multiple failures. The laboratory re-extracted the samples with acceptable LCS recoveries. All reported data in this SDG is from the second extraction and analysis of the samples. The data are usable for decision-making purposes.

In the EPH analysis, the surrogate recoveries in samples B30C17 and B30C23 are outside the quality control (QC) limits. These results are from the second extraction of the samples. Surrogate recoveries from the initial extraction were within the QC limits. The field sample data from both analyses agreed that there were no detectable analytes for this analysis. The laboratory evaluation of the data set and concluded that matrix interference was present. The EPH data may be considered estimated. Estimated data are usable for decision-making purposes.

In the EPH analysis, the matrix spike (MS) and matrix spike duplicate (MSD) recoveries are outside the QC limits. The laboratory evaluation of the data set concluded that matrix interference was present. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the EPH analysis, aliphatic hydrocarbons (C8-C10) were detected in the method blank (MB) and in the field samples. The laboratory qualified the associated data with "B" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0092

This SDG is comprised of 13 field samples. Five of those samples (B30C24, B30C26, B30C28, B30C30, and B30C32) pertain to the evaluation of the 100-N-85 borehole. Sample B30C30 is an equipment blank. These five samples were analyzed for EPH, NWTPH-Dx, NWTPH-Dx+, NWTPH-Gx, and PAH. Minor deficiencies are as follows.

In the PAH analysis, the LCS recoveries for chrysene (77.8%) and dibenz(a,h)anthracene (80%) are outside the laboratories QC limits. However, the MS and MSD recoveries for these analytes were within the QC limits. Because accuracy and precision are demonstrated by the MS/MSD, the laboratory reported the data without qualification. The data are usable for decision-making purposes.

In the PAH analysis, the relative percent difference (RPD) calculated between the primary and confirmatory columns for one or more analytes in samples B30C28 and B30C30 are outside the QC limits. The laboratory has qualified the associated data with "P" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the EPH analysis, the analyte was detected in the MB above the required detection limit, suggesting a possible high bias in the data. The laboratory has qualified the associated data with "B" flags. However, no detections were reported in the field sample data and there is no impact

on the evaluation of the 100-N-85 borehole from the high bias. The data are usable for decision-making purposes.

In the EPH analysis, the MS/MSD recoveries are outside the QC limits. The laboratory evaluation of the data set concluded that matrix interference was present. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

SDG XP0093

This SDG is comprised of eight field samples. Four of those samples (B30C34, B30C36, B30C38, and B30C40) pertain to the evaluation of the 100-N-85 borehole. These four samples were analyzed for EPH, NWTPH-Dx, NWTPH-Dx+, NWTPH-Gx, and PAH. Minor deficiencies are as follows.

In the EPH analysis, the surrogate recovery for the MSD is outside the QC limits. The surrogate recoveries for the parent sample and the MS were both within QC limits. Acceptable LCS recoveries indicate that the analytical system was operating within control. No target analytes were detected above the reporting limit and the deficiency in the MSD surrogate recovery appears limited to the MSD. The laboratory has qualified the associated data with "T" flags. There is no impact to the field sample data. The data are usable for decision-making purposes.

In the EPH analysis, the RPD calculated between the MS and the MSD is outside the QC limits. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the EPH analysis the C8-C10 aliphatic hydrocarbons were detected in the MB at concentrations below the reporting limit. This detection has minimal impact on the field sample data. The laboratory has qualified the associated data with "B" flags. The data are usable for decision-making purposes.

SDG XP0097

This SDG is comprised of two field samples. One of those samples (B30C42) pertains to the evaluation of the 100-N-85 borehole. This sample was analyzed for EPH, NWTPH-Dx, NWTPH-Dx+, NWTPH-Gx, and PAH. Minor deficiencies are as follows.

In the PAH analysis, the MS recovery is outside the QC limits. Additionally, one of the MS surrogates and the RPD calculated between the MS and the MSD are also outside the QC limits. All recoveries in the MSD and LCS are within the QC limits, indicating that the analytical system was operating within control. Results such as these in environmental samples are generally attributed to natural heterogeneities in the sample matrix. The laboratory has qualified the associated data with "T" flags. These data may be considered estimated. Estimated data are usable for decision-making purposes.

In the EPH analysis the C9-C10 aliphatic hydrocarbons were detected in the MB and in all of the field samples in this SDG at similar concentrations. These detections are above the reporting limit. The laboratory attributes these detections to impurities in the solvent used during solvent exchanges.

In the EPH analysis, one surrogate recovery for the MS was outside the QC limits. The surrogate recoveries for the parent sample and the MSD were both within QC limits. MS/MSD recoveries were outside QC limits for all aromatic EPH fractions and the MS C8-C10 aliphatic fraction. There is no impact to the field sample data. The data are usable for decision-making purposes.

In the EPH analysis, the RPD calculated between the MS and the MSD is outside the QC limits. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. These data may be considered estimated. Estimated data are usable for decision-making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) are routinely performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field quality assurance (QA)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples are shown in Table D-1. The main and QA/QC sample results are presented in Appendix A.

Table D-1. Field QC Samples.

Sample Collection Depth (ft bgs)	Main Sample	Duplicate Sample
22.5	B30C17	B30C19

bgs = below ground surface

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential concern. Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix A provides details on duplicate pair evaluation and RPD calculation.

None of the RPDs calculated for the 100-N-85 field duplicates exceed the QC limits.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit, including undetected analytes. In these cases, a control limit of ± 2 times the target detection limit is used (Appendix A) to indicate that a visual check of the data is required by the reviewer. Additionally, a visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

SUMMARY

Limited, random, or sample matrix-specific influenced batch QC issues, such as those discussed above, are a potential for any analysis. The number and types seen in these data sets are within expectations for the matrix types and analyses performed. The DQA review of the 100-N-85 waste site characterization sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for the 100-N-85 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes. The characterization sample analytical data are stored in the Washington Closure Hanford project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The characterization sample analytical data are also summarized in Appendix A.

REFERENCES

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